

Welcome

TDFM-9000

Operators Training



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- Overview of P25
- TDFM-9000 Architecture
- Specific Layout
- Basic Operations
- Advanced Operations
- Supervisory Operations
- Intro to Motorola CPS
 - Revision management
 - Cable Info
 - Read/Write
 - Input Channel
 - Trunking Considerations
- NIFOG Code-plug
- Field Support





While we are all Aviators, A&P's and Avionics Specialist, always remember, the Technisonic TDFM line of Civil Support radios is LAND MOBILE RADIO, in an Avionics body!

A Little History

Since 1979 Technisonic has focused its efforts on the development of aeronautical band VHF ground equipment and special mission airborne RF and audio communications systems. Technisonic is now well-established as a leader in the development of aviation-related special mission communications products.

Company Facts:

- Founded in 1979
- Employs 60 plus people engaged in all aspects of engineering, fabrication, production, quality, and administration.
- Established distributor relationship – Dallas Avionics in 1995
- Offered our first tactical radio in 1994



P25

(P25) was established to address the need for common digital public safety radio communications standards for first-responders and homeland security/emergency response professionals

P25 is the countries attempt at a radio interoperability standard. Originally designed to support four bandwidths, P25 has continued to evolve since its first deployments back in the early 90's

Core Bandwidths -	VHF FM	136 -174MHz	Federal
	UHF-LO	380-520MH	Civil – Muni / Federal
	7/800	764-870MHz	Statewide

Before P25, every manufacturer utilized its own signaling to tell their radio when to open squelch and pass traffic. In short, the systems were Proprietary. This caused significant problems in emergency and disaster situation.



Imaging a 3 Alarm Fire, Where three Different Fire Departments responded to the same large fire. Each truck coming from a different town, operating radios from a different manufacturer. In many cases this led to Truck #1 being unable communicate with truck two or three. This resulted in dangerous and possibly fatal breakdown of communications in Critical Situations.

Something had to be done, That something was a new radio standard call **Project 25, or P25.**

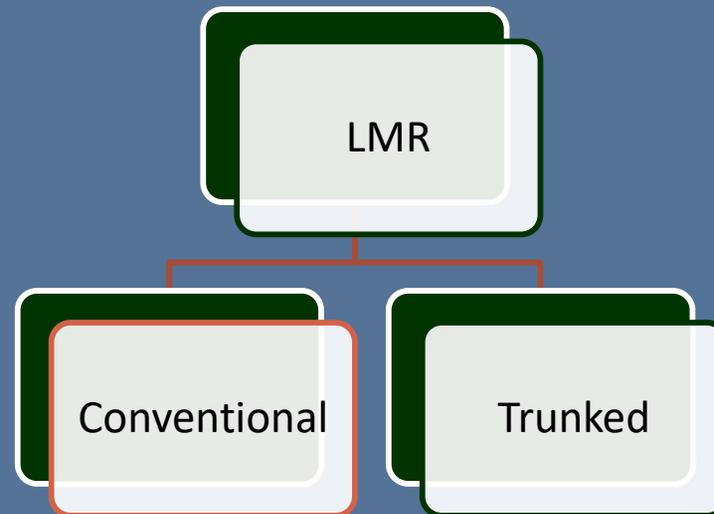
What is P25: Simply put, P25 is a communication standard shared across radio manufacturers that ensures that one manufacturer's radio transmission will be received by another manufacturer's radio. By adhering to the standard, now the critical Interoperability previously missing is now established



P25 Architecture

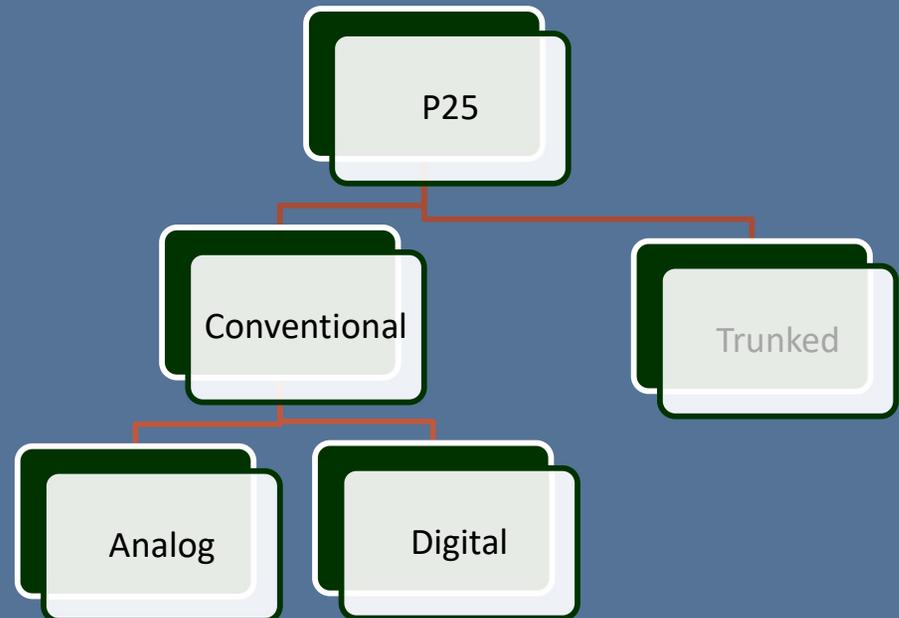
Land Mobile Radio is divided into two core architectures

Conventional and Trunked. Each architecture is unique and employs different terms and technologies.



Conventional systems are inclusive of two distinct modes
Analog and Digital, both are considered “Conventional”

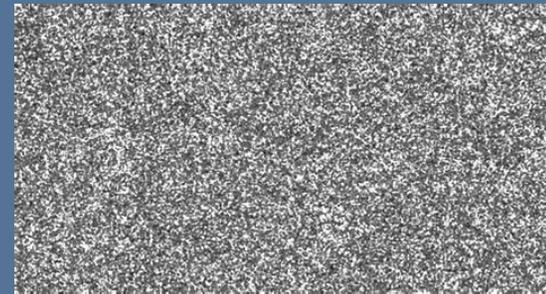
These two modes are part of the channel programming information. An analog channel will not break squelch when receiving a digital channel on the same frequency or vice versa. Having the proper mode programmed on the channel is critical.



The P25 Standard also established Conventional Signaling “MODES”
Analog and Digital

Analog is most common, 85% or so of LMR radio signals

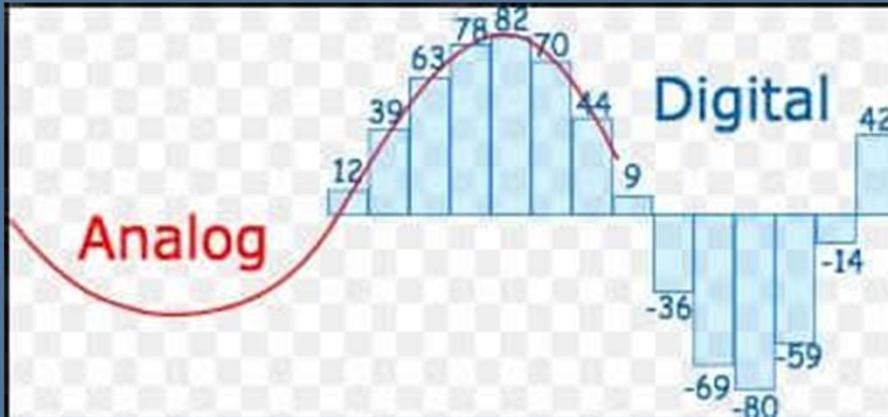
Analog consist of a long Wave type signal, as you get further from the source, more and more static will be heard until finally the station is no longer usable



Digital represents only about 15% of radio traffic at present

Digital consist of a Block style wave and is either 100% usable or 0% usable. Think of your Digital TV freeze.





Motorola ISM's

Analog = Non-Astro

Digital = Astro



RADIO 101

P25 Explained



Unlike your Aviation AM radios, FM radios allow for far more flexibility in the channel. In analog channel set ups, you must define the following attributes for the channel to work properly.

Receive Frequency

Transmit Frequency

TPL – Tone Private Line (PL Tone) aka (CTSS)

DPL – Digital Private Line (DPL TONE)

Mode – (Analog) (Digital) (Mixed)



Receive / Transmit Frequencies -

Conventional systems have the capability of supporting both-

- Simple Frequencies – RX/TX frequencies are the same such as 155.250
- Duplex Frequencies – RX/TX frequencies are different. RX 151.250 TX 167.500

When setting up your frequencies, especially while utilizing the Front Panel Programming capability, careful attention must be paid to this parameter.



Channel 1

Rx = 136.00

Tx = 136.00

A "**Simplex**" Channel has the same Rx and TX frequency different. This is basic "Line of Site" radio. You are talking directly to the other radio. "walkie talkie"



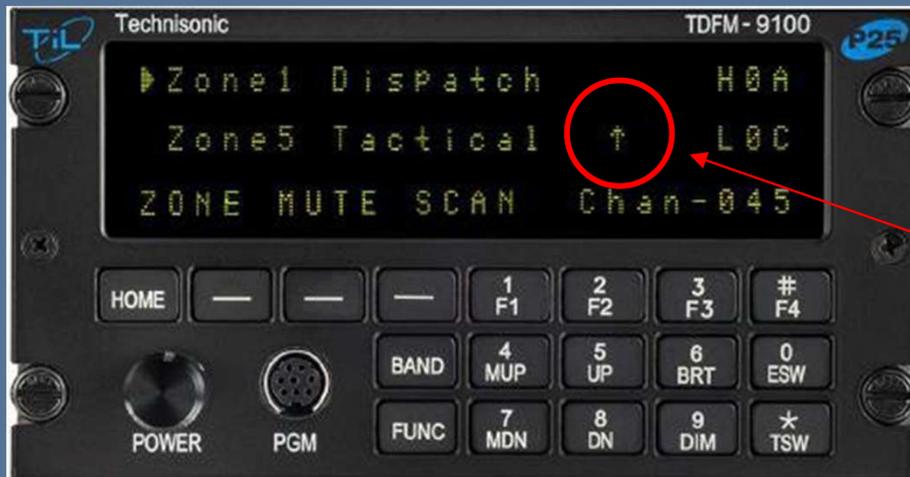
Channel 1

Rx = 136.00

Tx = 136.00

Analog Frequencies – Simplex or Direct





A Direct or Simplex Frequency is denoted by an up arrow ↑ displayed to the left of the Channel name.

Analog Frequencies – Simplex or Direct





Channel 1
Rx = 136.00
Tx = 154.250

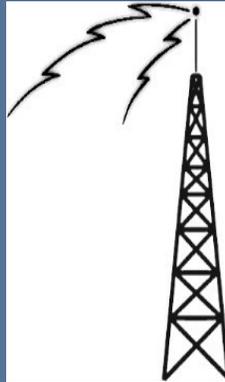


Channel 1
Rx = 136.00
Tx = 154.250

A **“Repeater”** Channel has different Rx and the TX frequencies. Since a radio cannot send and receive on the same frequency at the same time, two separate frequencies are used on Repeater or Duplex channel

Analog Frequencies Duplex or Repeater





Channel 1

Rx = 136.00

Tx = 154.250

Channel 1

Rx = 154.250

Tx = 136.000



Channel 1

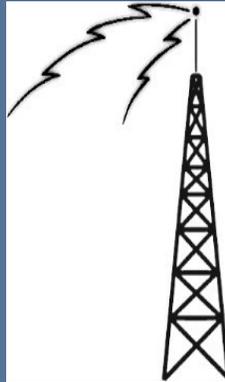
Rx = 136.00

Tx = 154.250

You are always utilizing someone's system when on a Repeater or Duplex frequency. Towers are placed strategically to ensure coverage on the ground.

Analog Frequencies Duplex or Repeater





Channel 1

Rx = 136.00

Tx = 154.250

Channel 1

Rx = 154.250

Tx = 136.000



Channel 1

Rx = 136.00

Tx = 154.250

A "**Repeater**" is used to reach beyond line of site, or to extend the range of Portable radio, Remember, this is land mobile radio, Portable radio are only meant to reach the closest tower, not to travel long distances.

Analog Frequencies Duplex or Repeater



TALK AROUND or GOING DIRECT on a REPEATER CHANNEL

Some radios allow a "DIR" (Direct or Talk Around) function, This feature allows you to By-Pass the tower with the touch of a button and essentially set up a Simplex or direct connection.

KEY: Both Parties must agree to go direct or Talk Around for this feature to properly work.

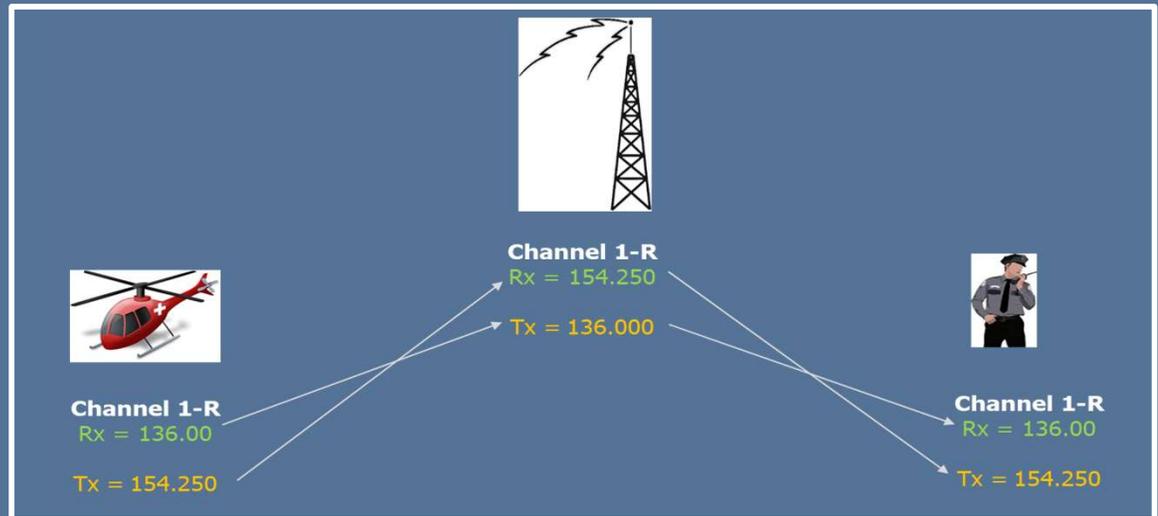


This is Global Feature on the APX module, by allowing a direct button the operator is essentially by-passing not just the selected channel, by ALL Repeater Channels programmed. For this reason, unless highly knowledgeable and experienced,

We do not recommend enabling the direct feature or button in your programming.

A better option to allow Talk Around is to program a Simplex Channel as the next channel in the code plug.

Simply program a simplex channel utilizing the channels receive frequency



Channel 1 – R
Channel 1



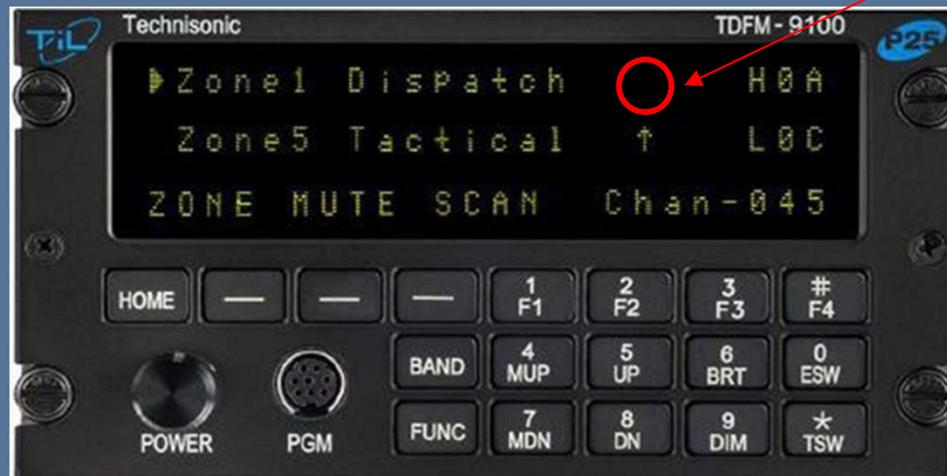
Channel 1
Direct Version
Rx = 136.00
Tx = 136.000

Channel 1 Direct
Version
Rx = 136.00
Tx = 136.000





A Duplex or Repeater frequency is denoted by the absence of the arrow.



Analog Frequencies – Simplex or Direct



PL Tones are a way of limiting the squelch break of your radio while on a common Analog frequency. By enabling a PL tone, the sending radio and the receiving radio will only break squelch for each others transmissions, other non associated traffic will not be heard.

Aircraft on the same frequency that do not have tones enabled, WILL still hear your transmission in the clear. Tones can be set up on both RX and TX frequencies.

You must ensure you set the proper tone code for your transmission to open the squelch of the other radio.

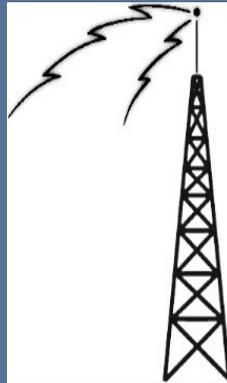
TPL – Tone Private Line (PL Tone)also (CTSS)

DPL – Digital Private Line (DPL TONE)

When no (PL, CTCSS, Sub Audible) tone is present, this is known as CSQ (carrier or open squelch). All traffic passes and will open squelch. EVERYBODY HEARS



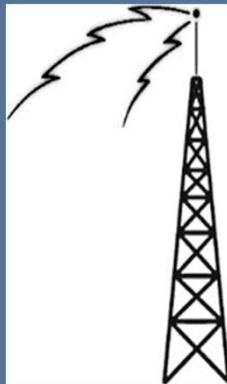
White Channel
Rx = 136.00
Tx = 154.250



White Channel
Rx = 154.250
Tx = 136.00



White Channel
Rx = 136.00
Tx = 154.250

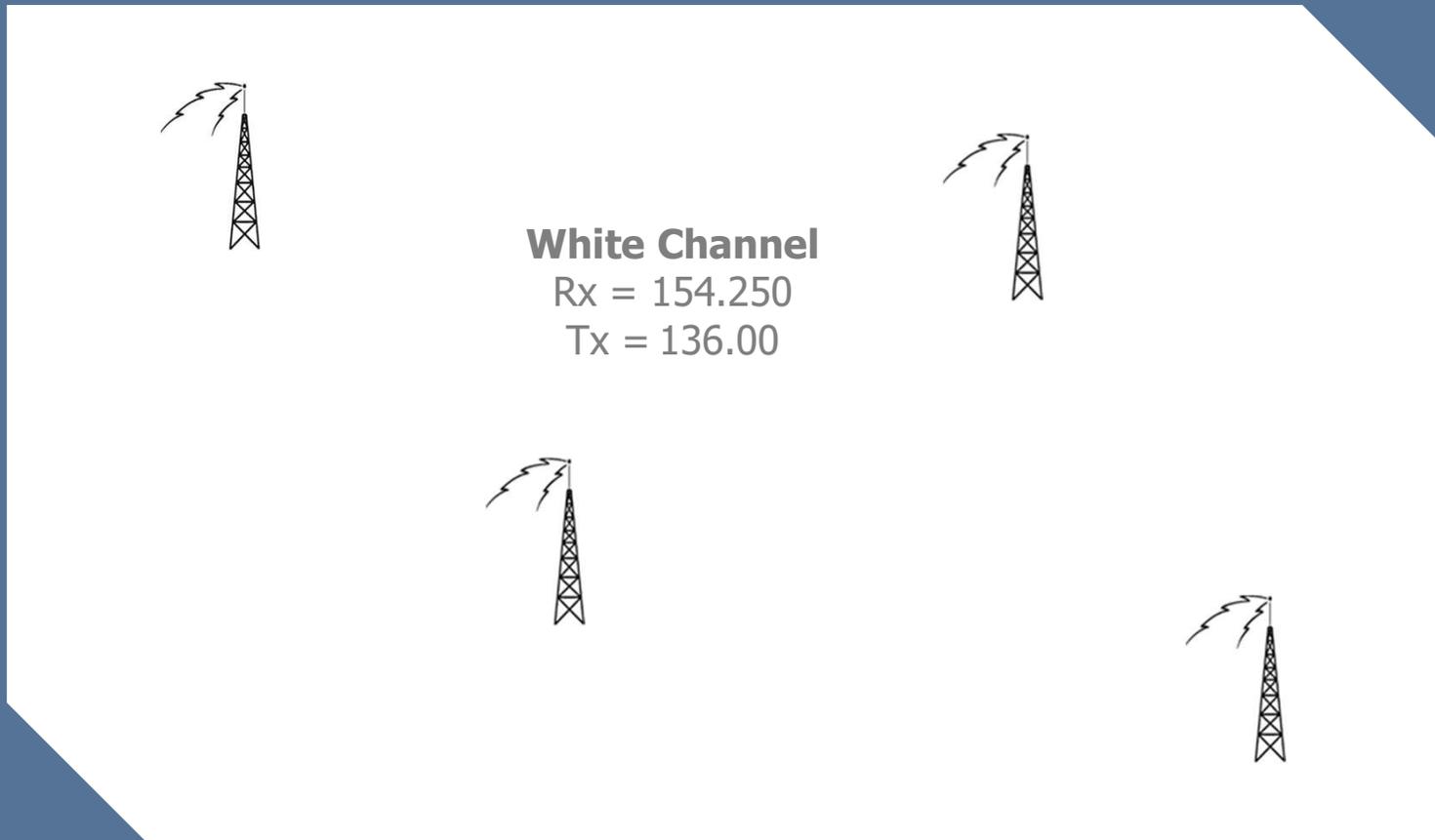


White Channel
Rx = 154.250
Tx = 136.00

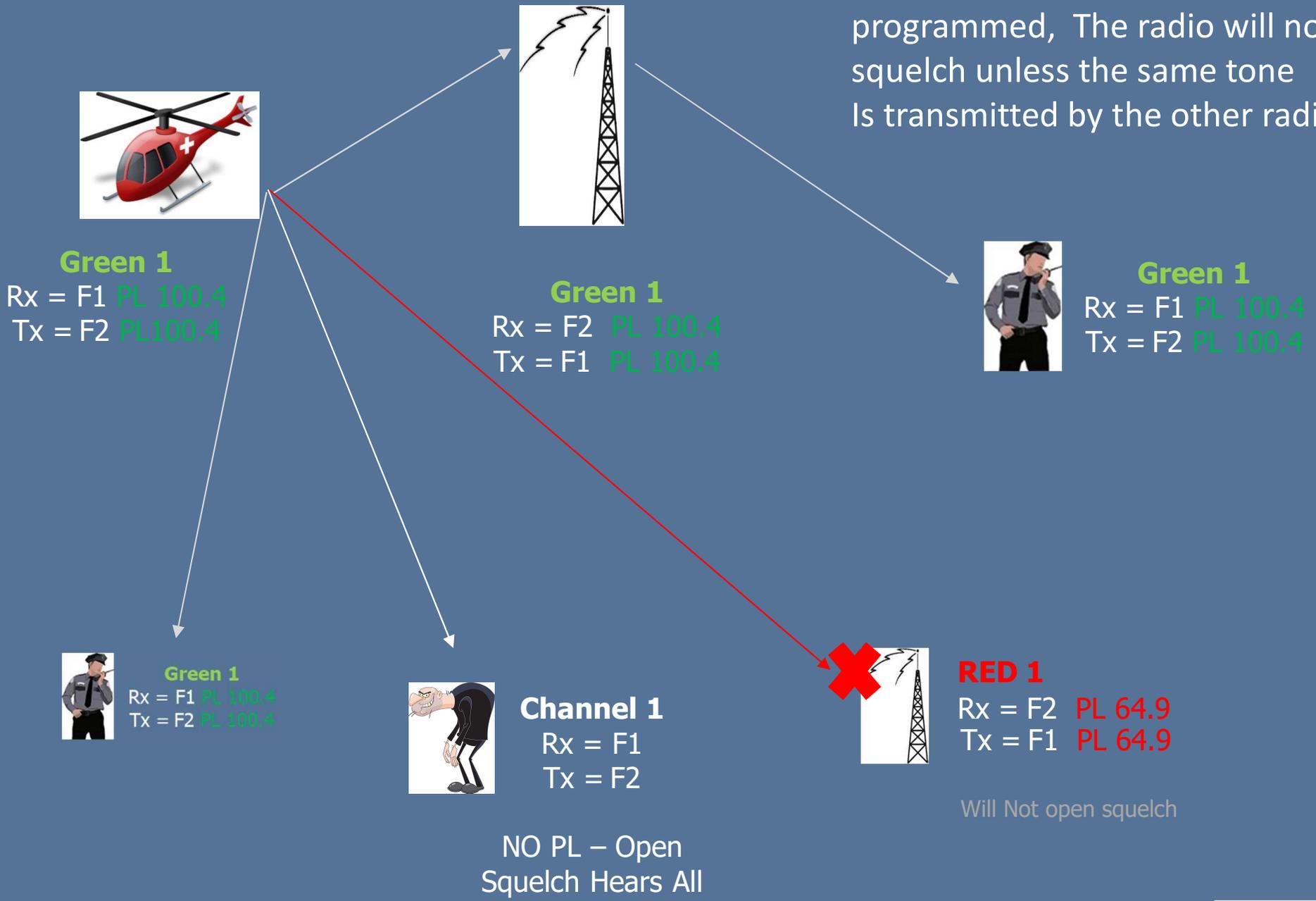


White Channel
Rx = 136.00
Tx = 154.250

St. Croix County Sheriff Radio System



When a RX PL tone has been programmed, The radio will not open squelch unless the same tone Is transmitted by the other radio.



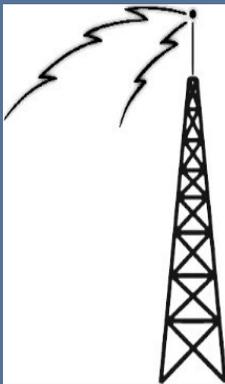
Analog Frequencies – PL Tones



When a RX PL tone has been programmed, The radio will not open squelch unless the same tone is transmitted by the other radio.



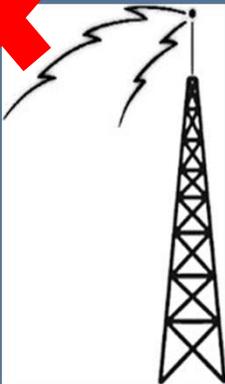
Green Channel
Rx = 136.00
PL 100.4
Tx = 154.250
PL100.4



Green Channel
Rx = 154.250
PL 100.4
Tx = 136.00
PL 100.4



Green Channel
Rx = 136.00
PL 100.4
Tx = 154.250
PL 100.4



Red Channel
Rx = 154.250
PL 64.9
Tx = 136.00
PL 64.9

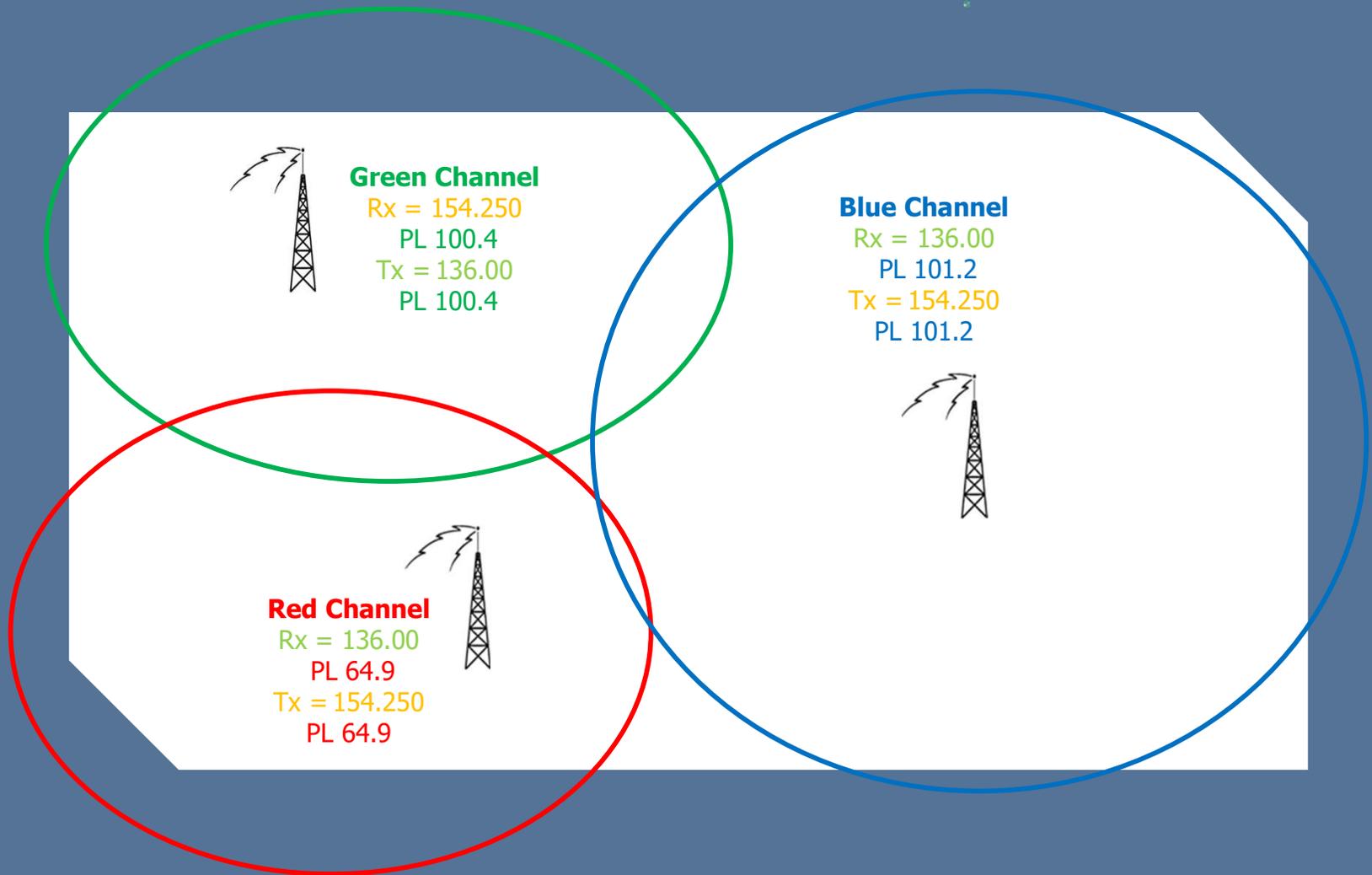


Red Channel
Rx = 136.00
PL 64.9
Tx = 154.250
PL 64.9

Analog Frequencies – PL Tones



St. Croix County Sheriff Radio System

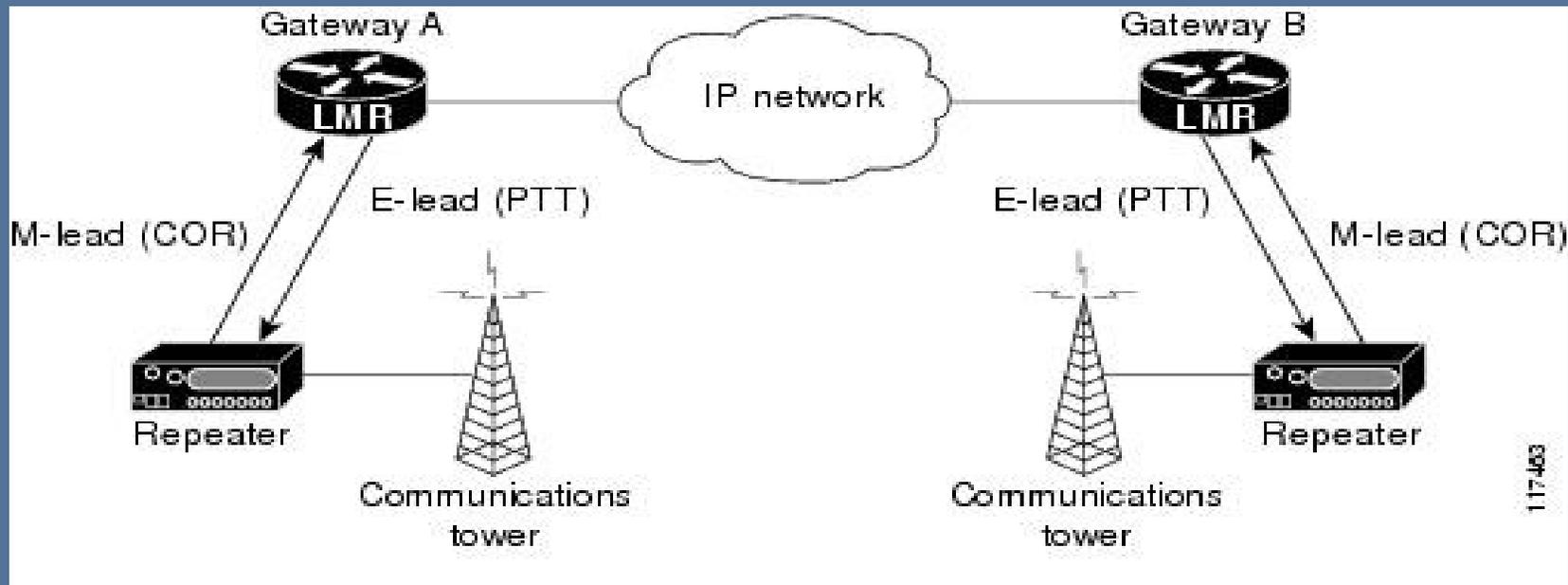


Analog Frequencies – PL Tone Use



Digital (p25) set ups, you must define the following attributes for the channel to work properly.

- Receive Frequency
- Transmit Frequency
- NAC



NAC codes are user programmable and are typically used to control network access but may also be used to steer repeater functions . NAC codes minimize co-channel interference and allow repeater addressing by keeping the receiver squelched unless a signal with a matching NAC arrives.

When programming a digital channel you must define the NAC. Without the proper NAC code, the radio will not break squelch, nor will you reach the other party.

In many cases the default NAC code of 293 is used. This should not be changed unless your frequency information directly includes this information

** NAC codes must be defined for both RX and TX Frequencies.**

As each conventional channel is defined by individual Receive and Transmit information, it is possible to have a Mixed Mode Channel.

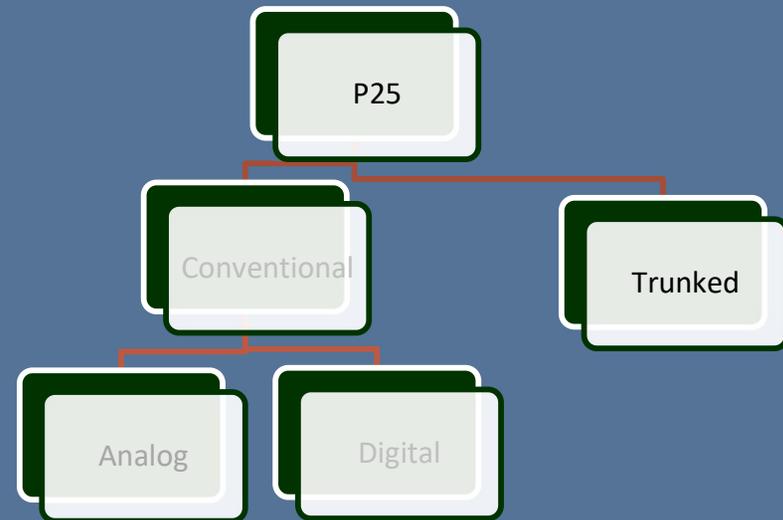
RX Frequency	165.25	TX Frequency	152.625
TPL	None	TPL	110.9
DPL	None	DPL	None
Mode	Mixed	Mode	analog
NAC	293	NAC	293

Trunked Systems:

These are managed via the System Administrator - Trunked systems are tightly controlled and managed and not accessible by non-authorized personnel or radios.

Talk groups are a capability of trunked digital systems, When utilizing a talk group, you are accessing a community of users or sub-community of users on the system. Only those with the same talk group will be included in the conversation. The radio system itself actually assigned and manages the frequency information internally.

Talk Groups are a trunked feature and are not programmed by the pilot.



Today's P25 Trunked Radio systems

Standards Based –
Complicated Infrastructure
Conventional Systems

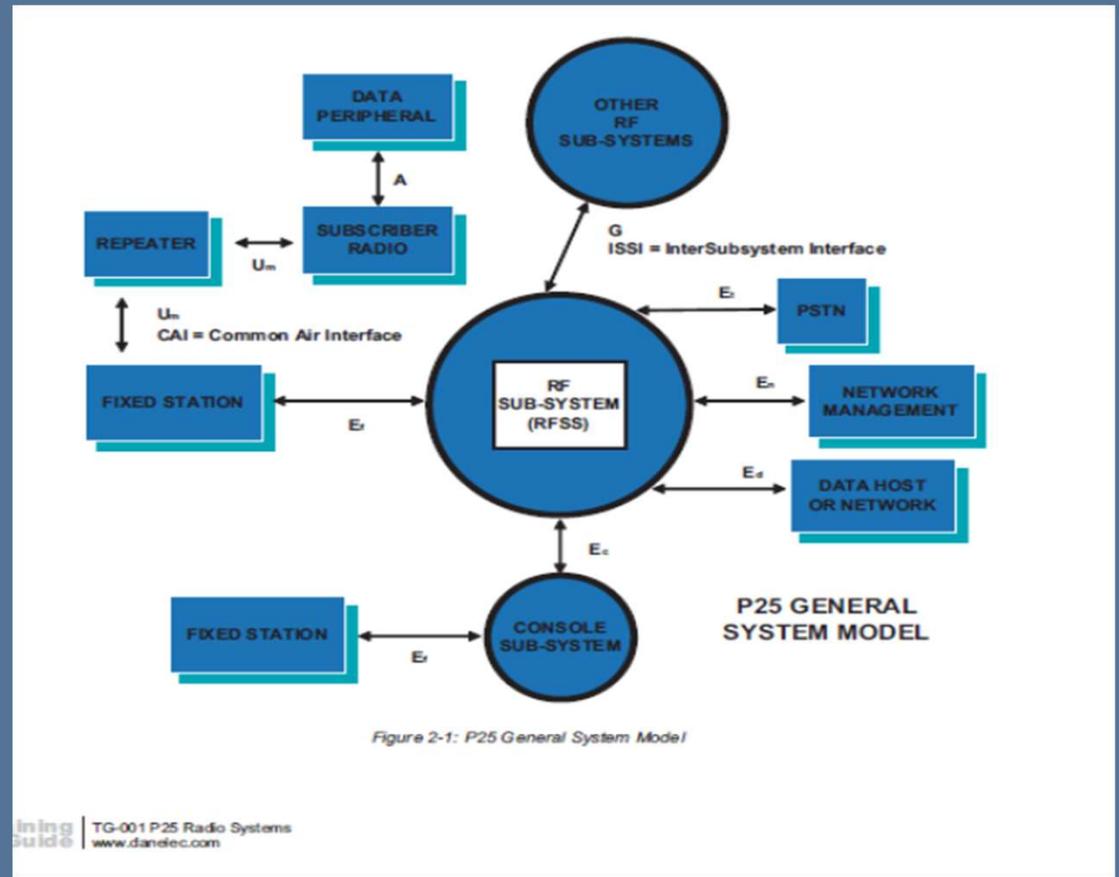
- Analog
- Digital

Trunked systems

Multiple access points

- Consoles
- Repeaters

Encryptions

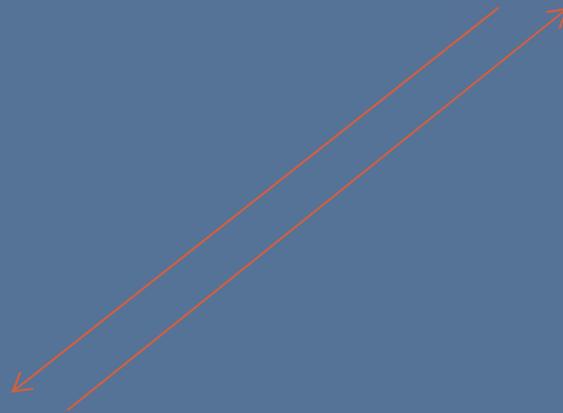
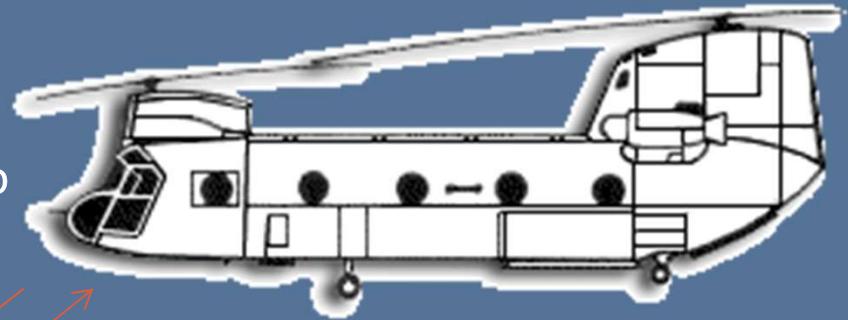


(P25)

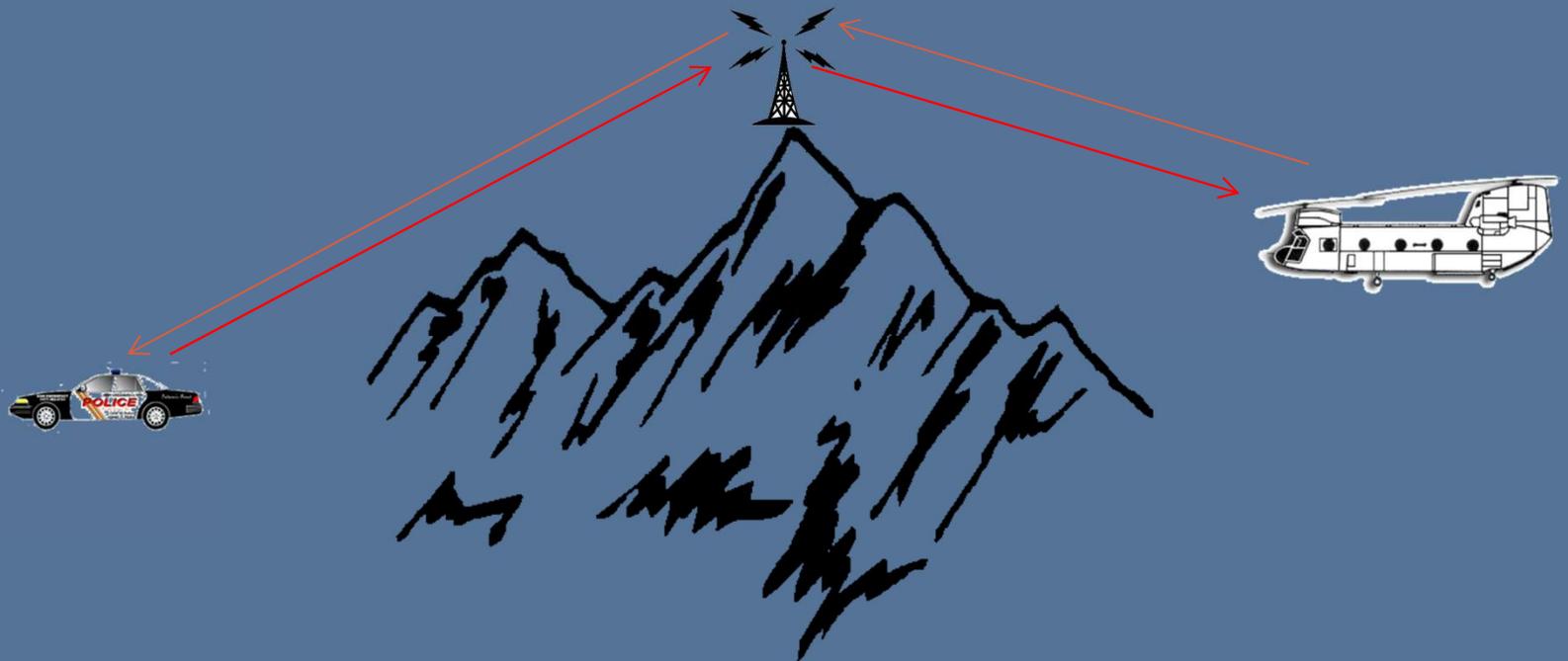


Direct Channels

Communication takes place via a direct line of sight. Direct channel range may vary based on altitude of the aircraft in relation to surrounding terrain.



Repeaters are used in many areas to extend the range of subscriber radios. Repeaters are used in many cities to support radios across a large geographic area. Repeaters utilize Duplex channels exclusively and are the backbone of Trunked radio systems. If you are working on an 800Mhz system. Chance are very high you are accessing the systems repeaters.





Questions ?



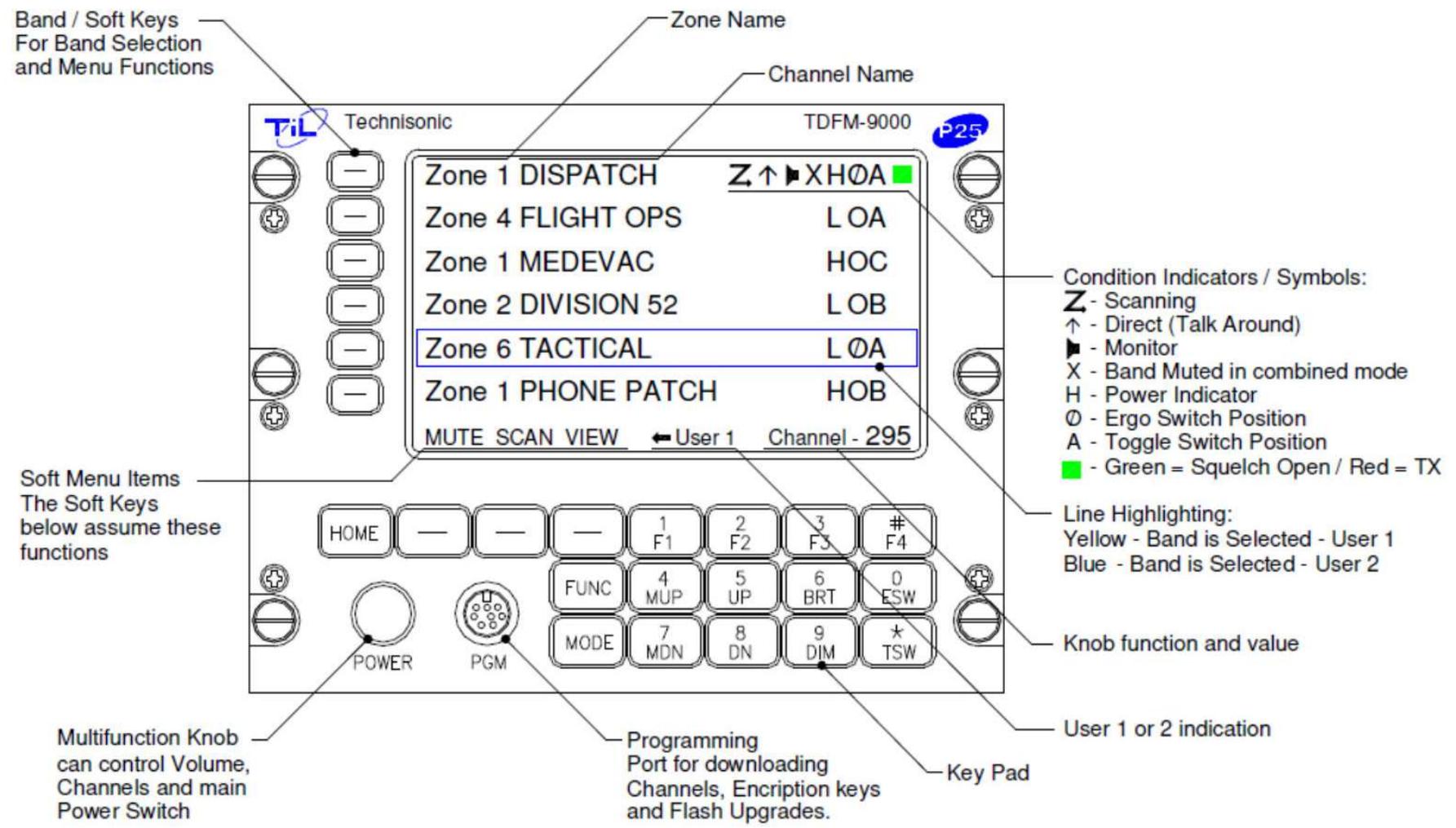
TDFM-9000 Training Course



TDFM 9000 OPERATION

2.2 FRONT PANEL

Refer to the diagram below:



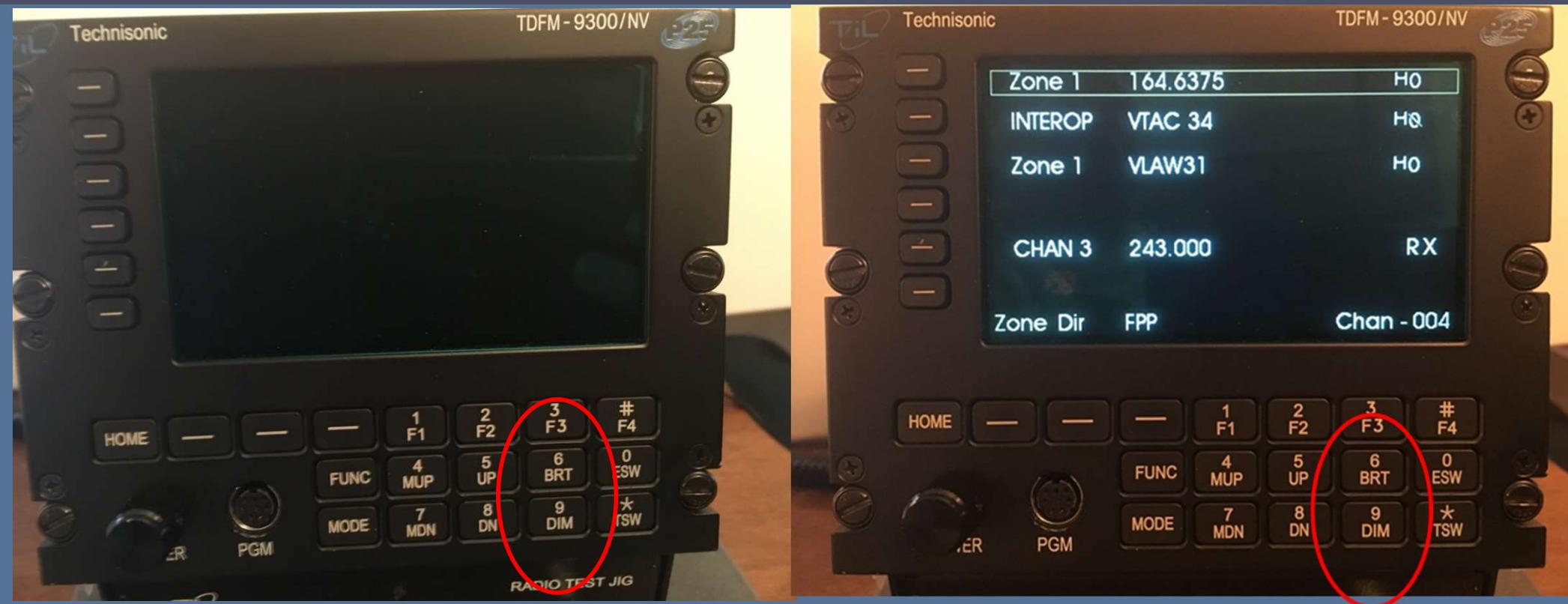
TDFM 9000 OPERATION



To turn the unit on:

- Radio DOES NOT turn on automatically with aircraft power.
- Push in on the Multimode knob for 1 to 2 seconds
- NOTE: If the display remains dark after 30 seconds, press the “BRT” button a few times.

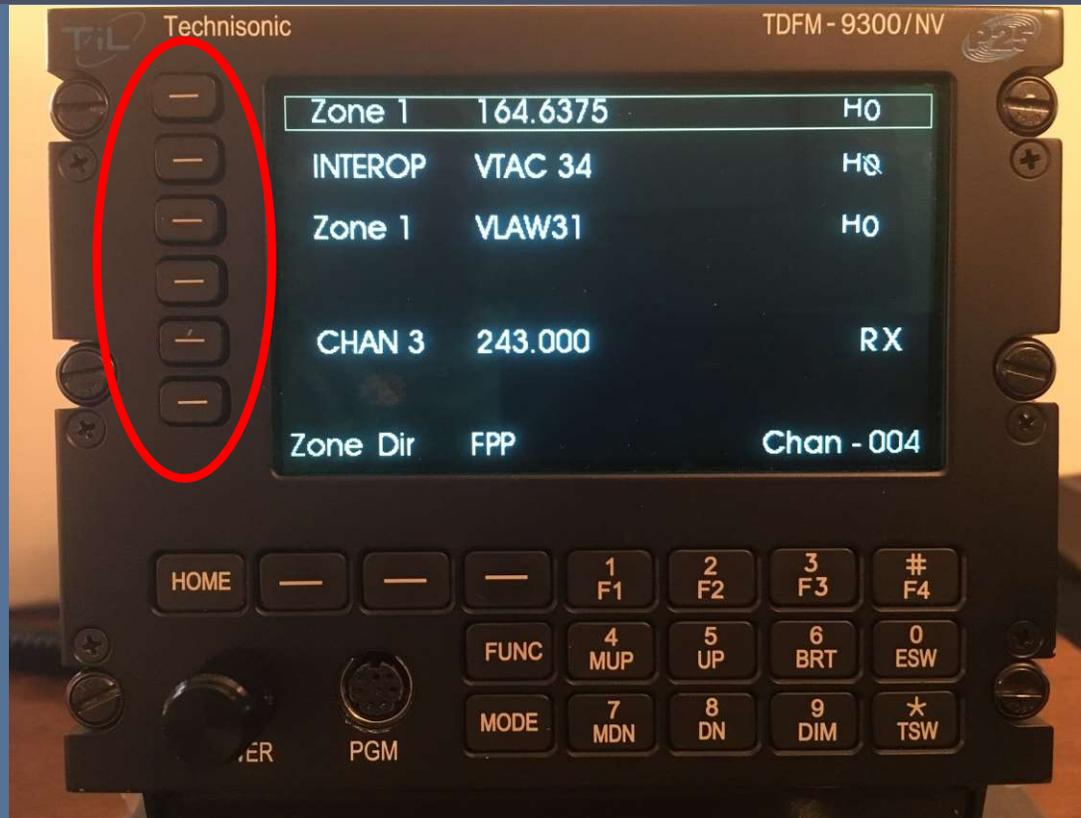
TDFM 9000 OPERATION



To set the display brightness:

- Display brightness is manually set by the operator.
- Press the “BRT” button to increase display brightness.
- Press the “DIM” button to decrease display brightness.
- The unit powers up at the brightness level it was at power down.

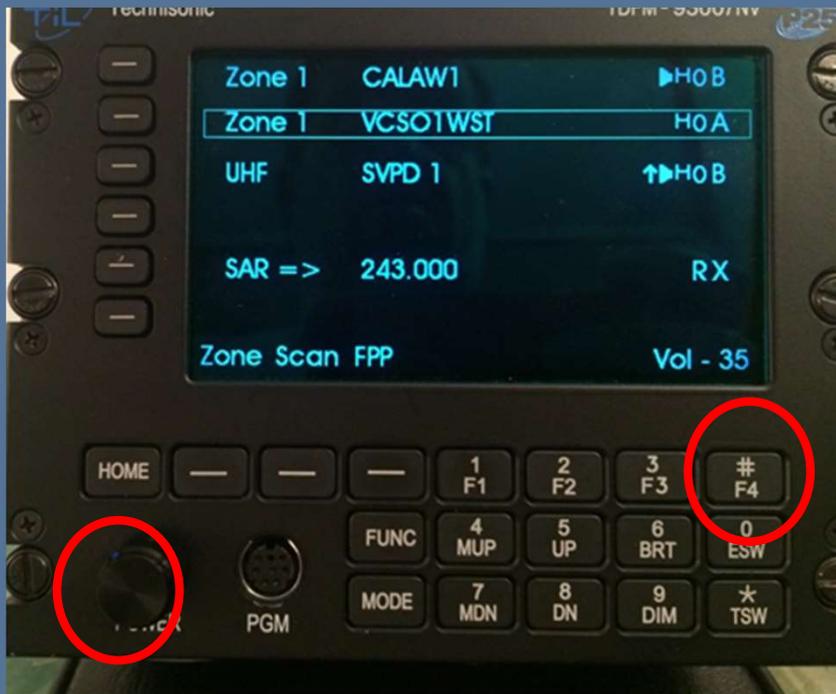
TDFM 9000 OPERATION



Module Selection

- Selecting the module to transmit or update is accomplished by pushing the corresponding button next the desired module. The square box indicates which module is your transmit module as well as the module that all the buttons will manipulate.

TDFM 9000 OPERATION



Setting Volume – “F4”

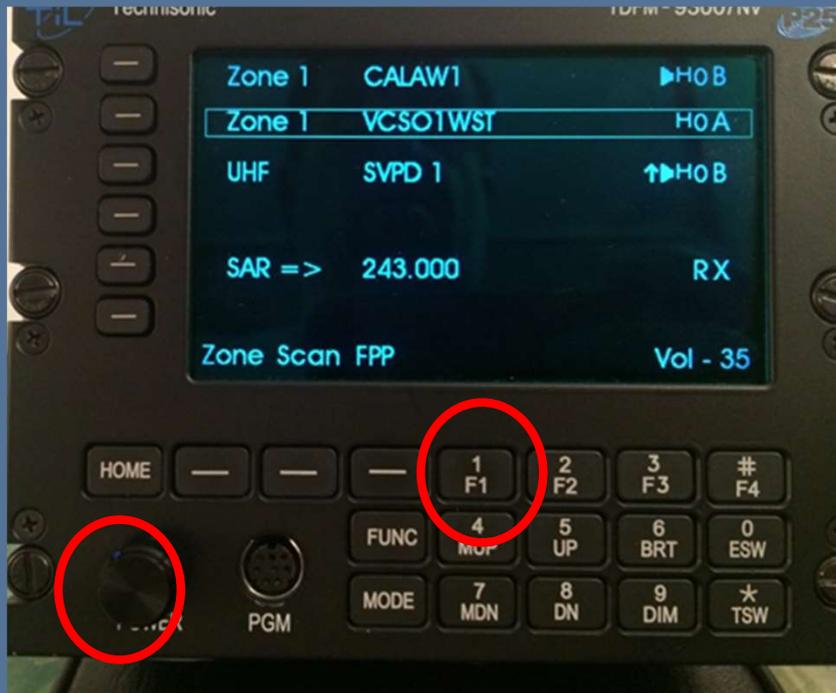
Press the Multimode knob so that “Vol” is shown in the lower right hand display.

Select the module by pressing the appropriate band select button. Then press F4 -Volume Set Tone. As long as F4 is pressed, the module will generate a tone in the headset that approximates normal voice volume level. Set the volume level by turning the Multimode knob.

NOTE if no tone is heard:

- 1) Make sure the audio panel volume knob is at its normal position
- 2) Make sure the module is not muted (Mute indicator is an “X” on the module line). Unmute by pressing the band select button once. The “X” will disappear.

TDFM 9000 OPERATION



Setting Volume – “F1”

For conventional analog channels, press the Multimode knob so that “Vol” is shown in the lower right hand display.

Select the module by pressing the appropriate band select button. Then press “F1” – Audio Unsquench button. As long as F1 is pressed, the receiver will unsquelch . Set the volume level by turning the Multimode knob.

NOTE if no unsquelched audio is heard:

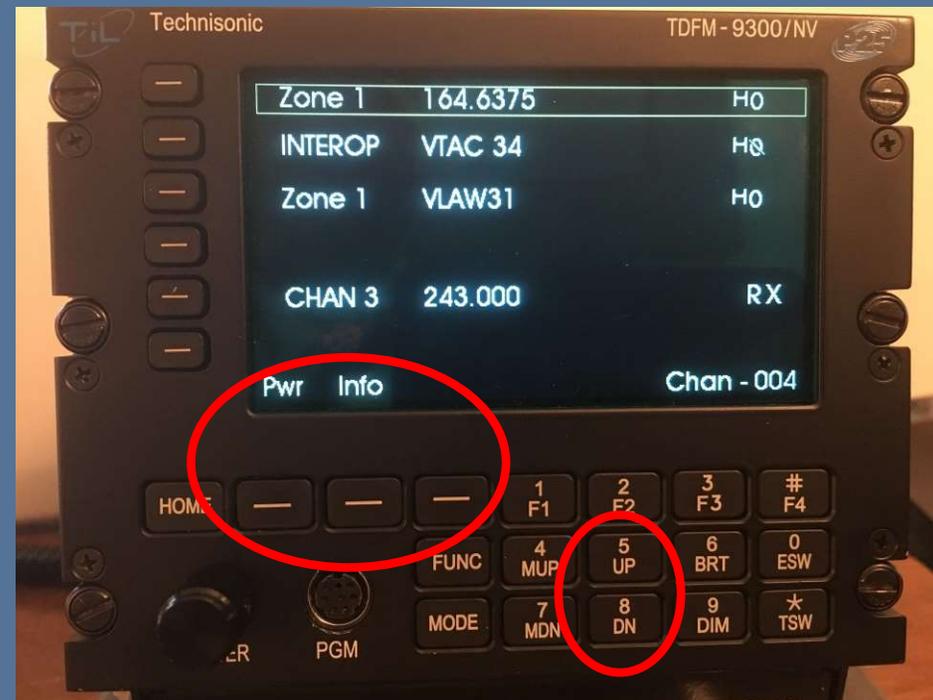
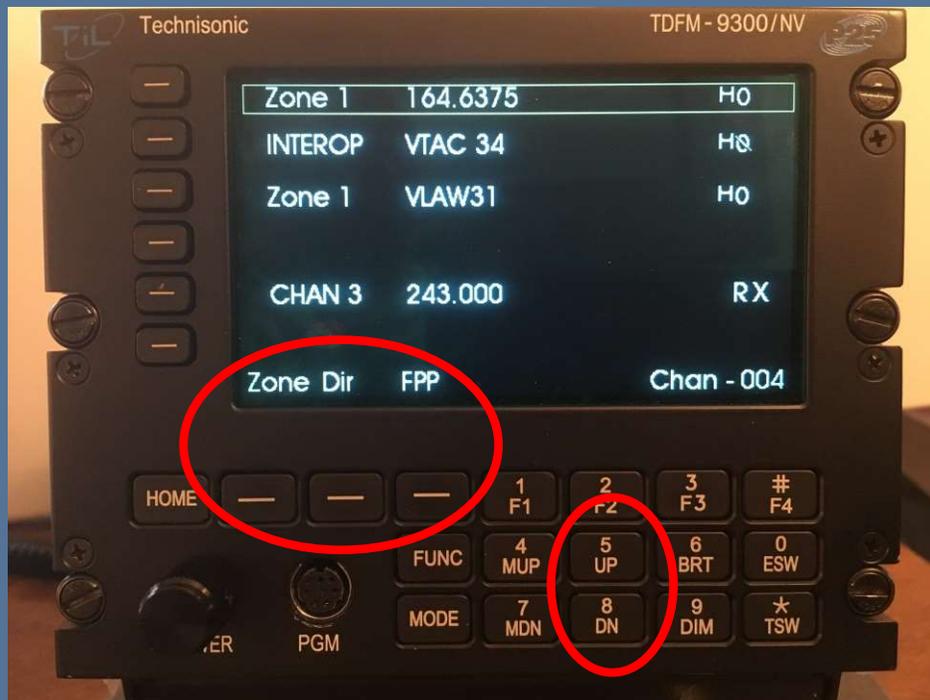
- 1) Make sure the audio panel volume knob is at its normal position
- 2) Make sure the module is not muted (Mute indicator is an “X” on the module line)
Unmute by pressing the band select button once. The “X” will disappear.

TDFM 9000 OPERATION

Module 1 - VHF				Module 2 - UHF				Module 3 - VHF & 7/800			
Zone #	Zone Name	Channel #	Channel Name	Zone #	Zone Name	Channel #	Channel Name	Zone #	Zone Name	Channel #	Channel Name
1	VHFFPP	1	EMPTY 1	1	UHFIOP1	1	NC2	1	7IOP2	1	7CALL50
	
		32	EMPTY 32			40	LE 18/D			64	7DATA89D
2	VHFFIRE	1	NATFF	2	UHFTEST	1	403.00000	2	7AIRGND	1	7AG58D
		2	AIRGUARD-USFS		
						10	UTAC41D			15	7AG88D
3	VHFIOP2	1	NC1					3	7TEST	1	765.00000
	
		29	IR8							11	868.98750
4	WX	1	VHF WX1					4	VHFFIRE	1	NATFF
								2	AIRGUARD-USFS
		7	VHF WX7					5	VHFIOP2	1	NC1
									
5	MARINE	1	MARINE 01A						WX	1	VHF WX1
	
		49	MARINE 88A							7	VHF WX7
								6	MARINE	1	MARINE 01A
									
6	VHFTEST	1	136.00000							49	MARINE 88A
	
		10	VTAC11					7	VHFTEST	1	136.00000
									
										10	VTAC11

- Each of the 3 Modules has its own set of Preset Channels.
- Channel memory is set up in multiple Zones (Banks) each with multiple Channels.
- Zones have names with a total of 8 characters. Ex: "VHFFPP", "MARINE".
- Channels have names with a total of 14 characters. Ex: "ICALL", "MARINE01"

TDFM 9000 OPERATION



Soft Keys

- Their functions correspond to the above labeled options. There can be 9 options that can be controlled by the Up (5) & DN (8) buttons stepping thru 3 options at a time.

TDFM 9000 OPERATION

Soft Keys for VHF (Module 1)

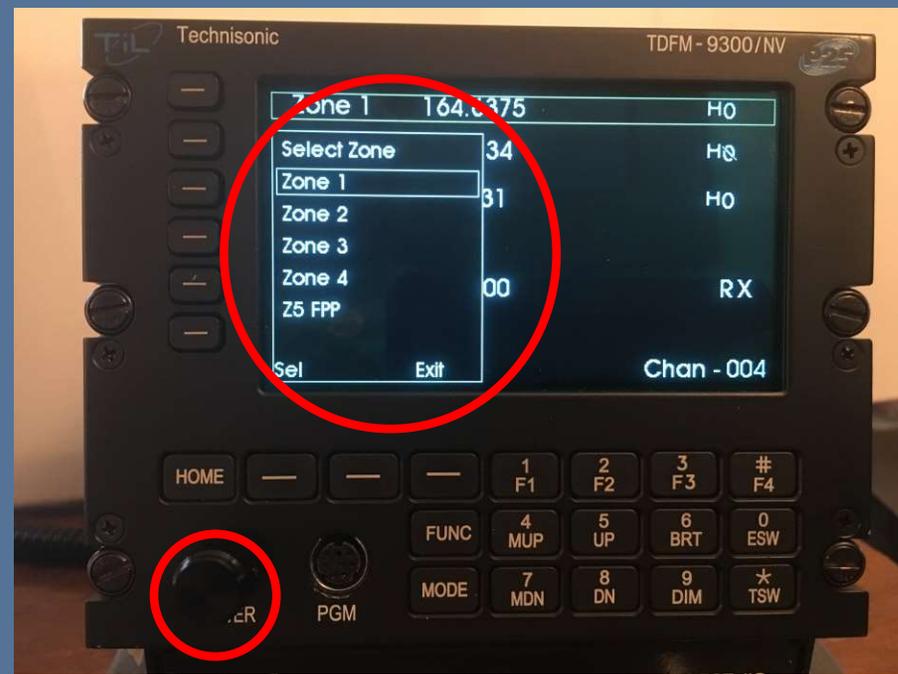
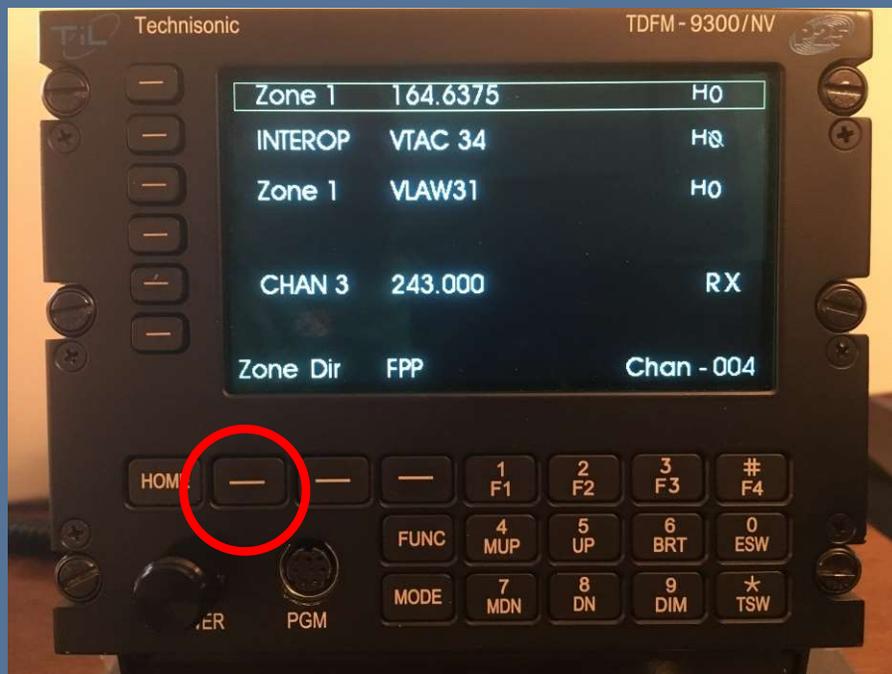
- “**ZONE**” allows for changing zones to find desired Channel
- “**PWR**” allows the operator to select between low or high transmit power.
- “**FPP**” enter conventional channel directly through the radio's front panel, via the radio's menu navigation and keypad buttons
- “**INFO**” view basic radio information such as IP-related information and buttons / switches control mapping,

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Soft Keys for UHF (Module 2) & 800/VHF (Module 3)

- “**ZONE**” allows for changing zones to find desired Channel
- “**PWR**” allows the operator to select between low or high transmit power.
- “**INFO**” view basic radio information such as IP-related information and buttons / switches control mapping,

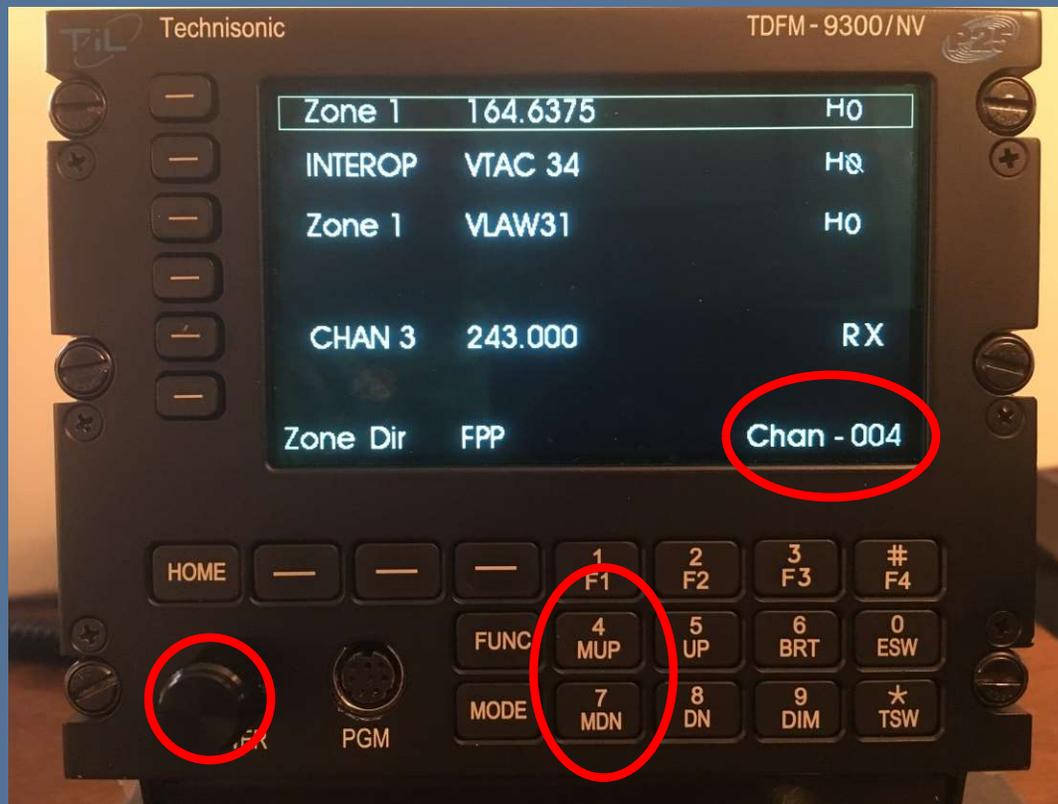
TDFM 9000 OPERATION



Changing to a desired Zone

- Press the "Zone" soft key and the above menu appears
- Rotate the knob to move the highlighted box to the desired zone
- Press the "Sel" soft key to select that zone

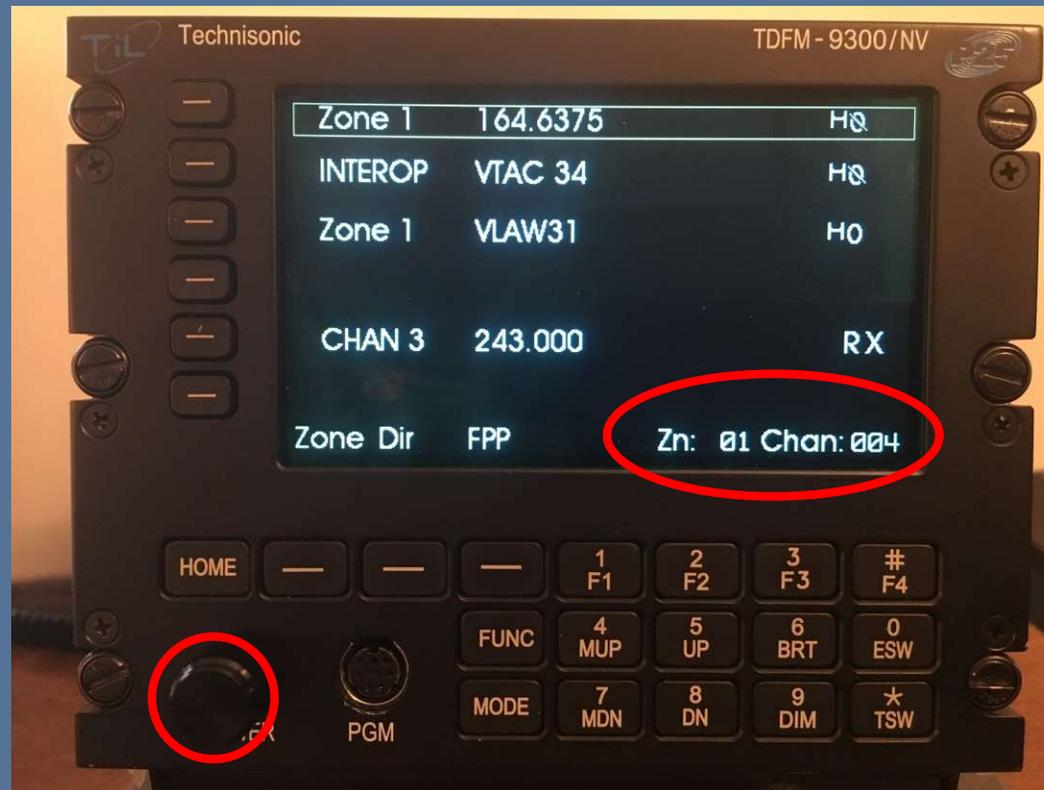
TDFM 9000 OPERATION



Changing to a desired Channel

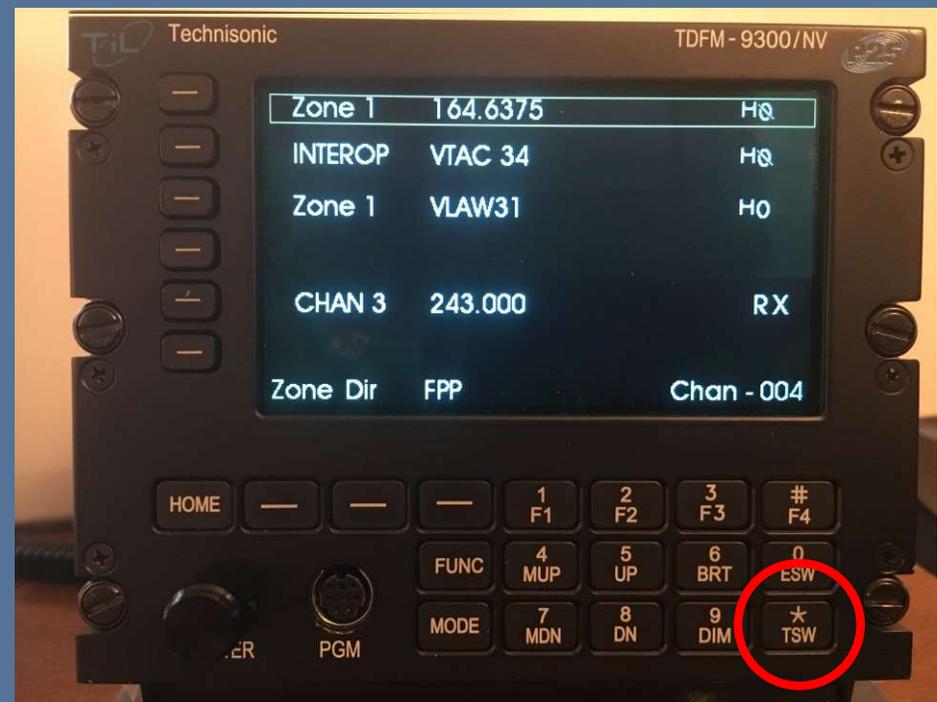
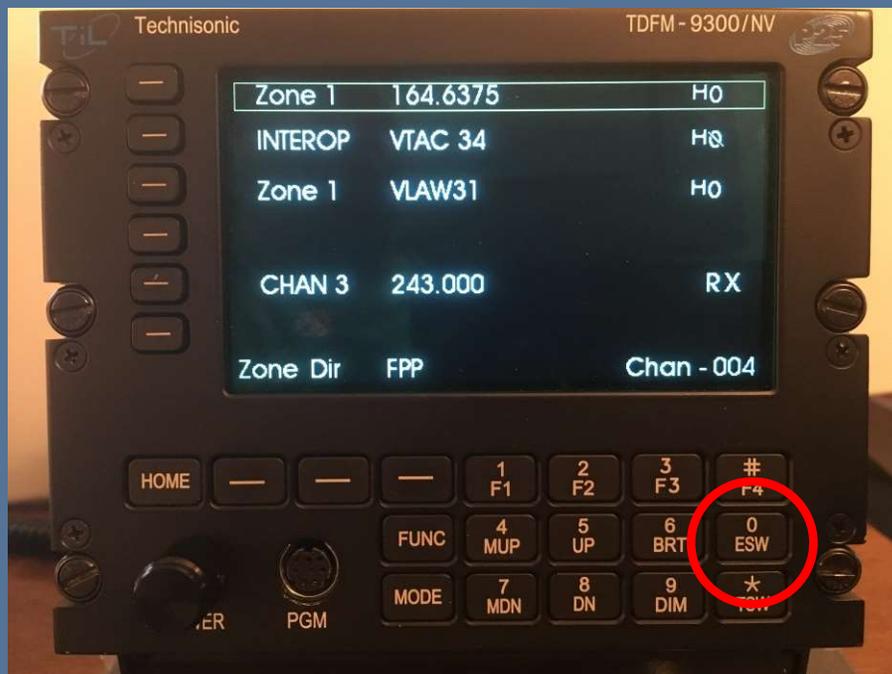
- Use the “MUP”(4) or “MDN”(7) keys to scroll thru channels within the selected zone.
- Press the Multi-mode knob so that “Chan” is displayed in lower right of display. Then rotate knob to change channel.

TDFM 9000 OPERATION



- Third way is to push the Multimode knob to display Zn:xxx Chan:xxx in the lower right corner.
- Then enter in the desired 3 digit Zone and the 3 digit Channel. The radio will automatically jump to that Zone & Channel.
- NOTE: This function may be disabled during setup/configuration.

TDFM 9000 OPERATION



Encryption Switch (ESW), Toggle Switch (TSW), F2, F3

- Both are disabled at this time. Can be re-enabled via CPS.
- “ESW” Normally controls encryption on/off.
- “TSW” can control user selectable functions set in CPS.
- “F2” and “F3” can control user selectable functions set in CPS.

TDFM 9000 OPERATION

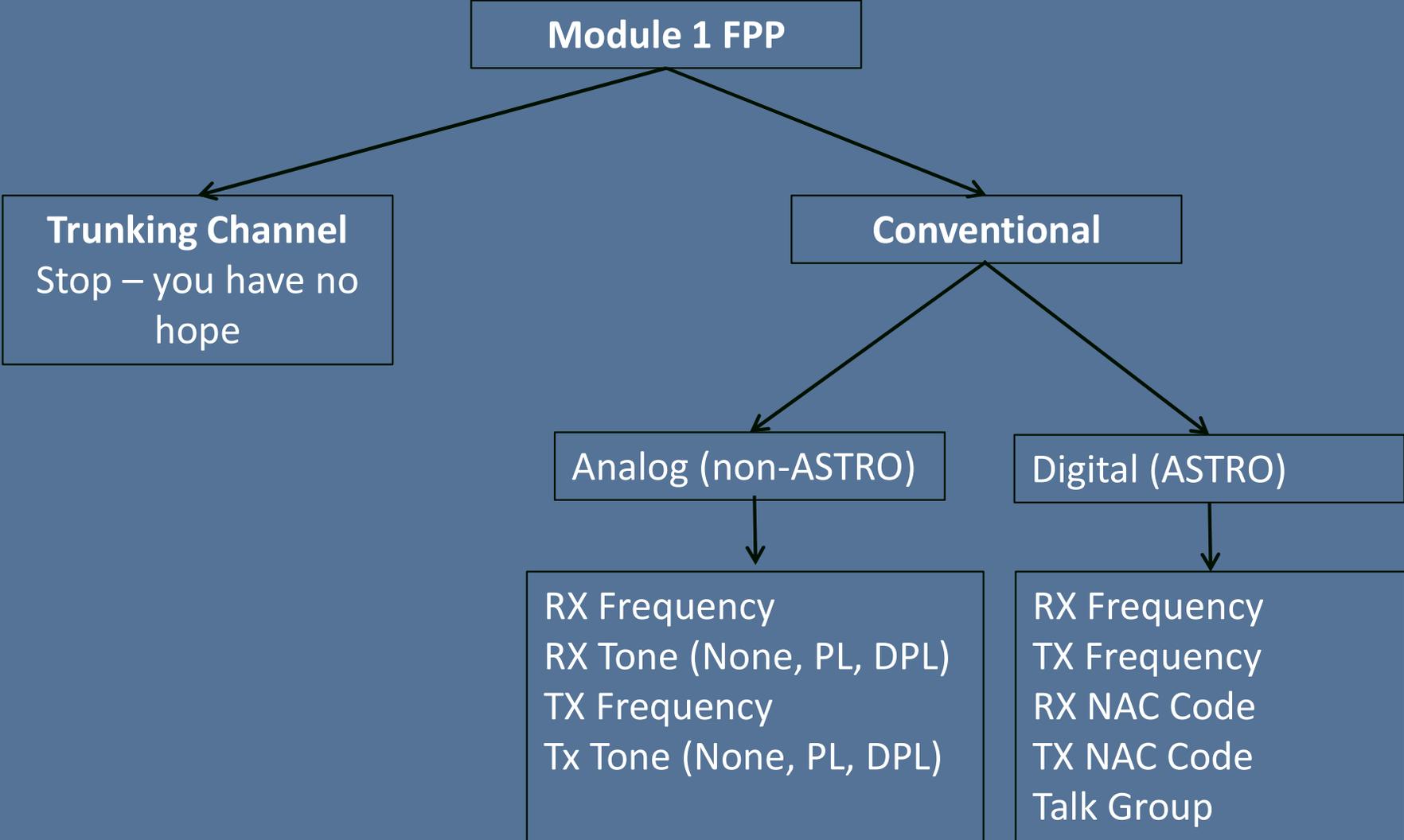
“FPP” Front Panel Programming

This optional feature allows a crew member to modify a channel on the fly without Motorola CPS software. It can only be a conventional channel. No trunking.

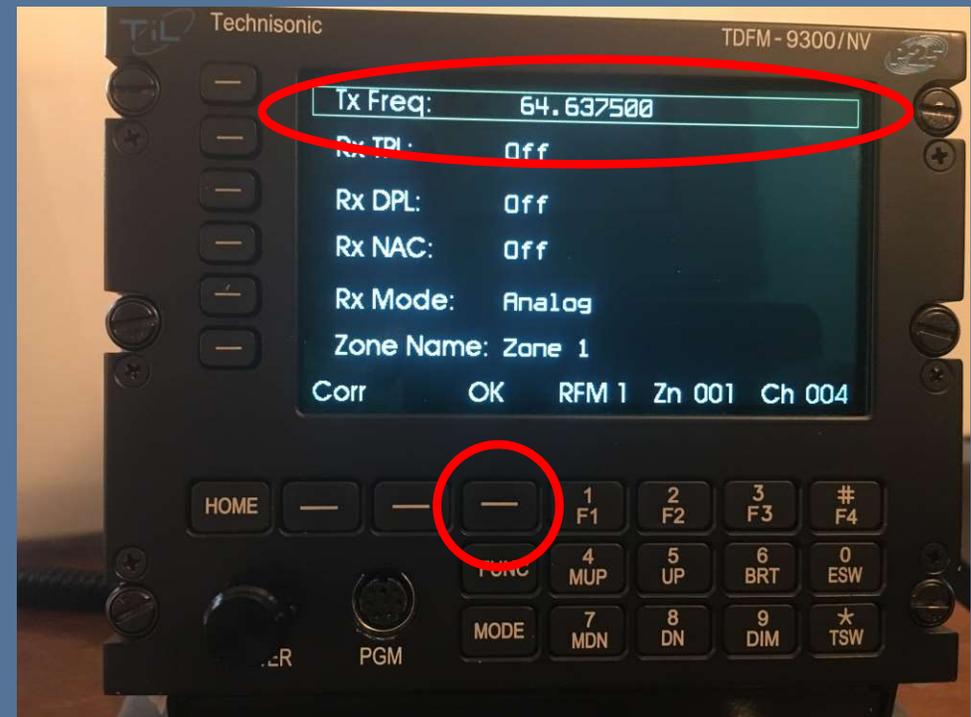
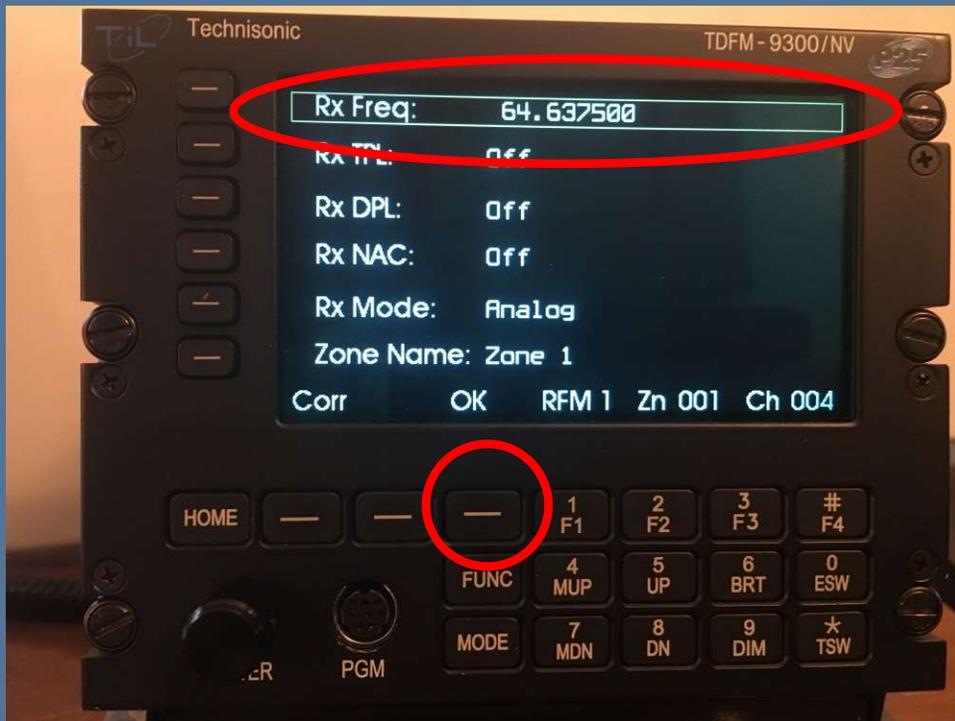
NOTE:

- 1) ONLY MODULE 1 (VHF) has FPP capability.
- 2) ONLY the zone named “VHFFPP” has this capability.
- 3) 32 channels have been setup in this zone for you to use.
- 4) You may use FPP mode to LOOK at channels in other zones on Module 1 (VHF) but you will NOT be able to CHANGE what is programmed in those zones.

TDFM 9000 OPERATION



TDFM 9000 OPERATION

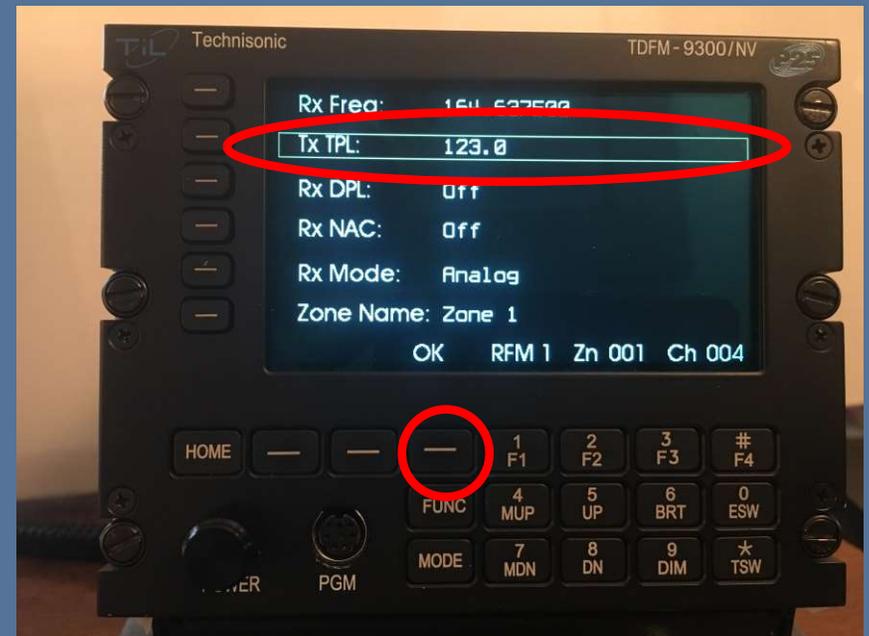
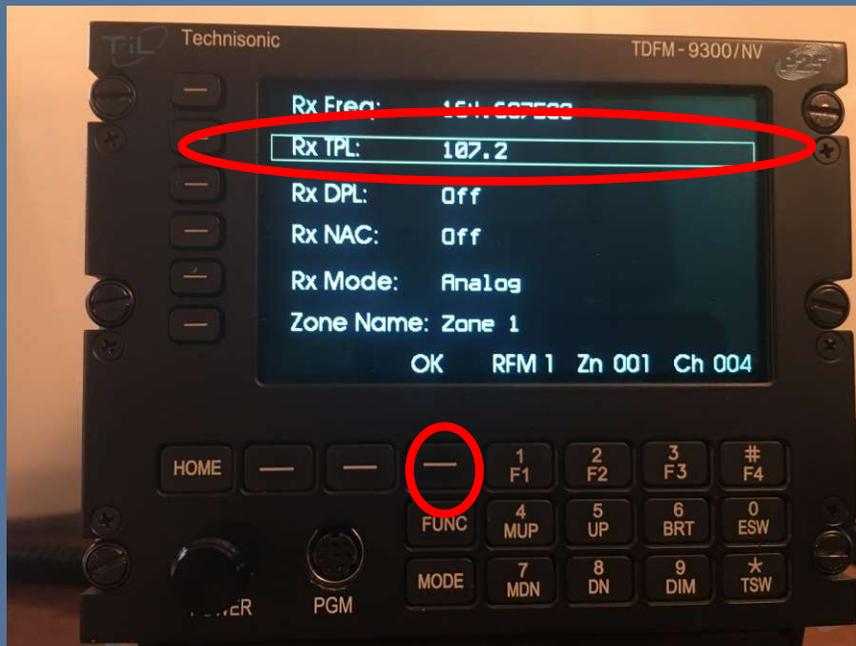


- FPP-The box will first appear over “RX Freq”. Input your RX Freq. Then press “OK” to accept and the radio will toggle over to “TX Freq”. Input TX Freq and press “OK” to accept

NOTE:

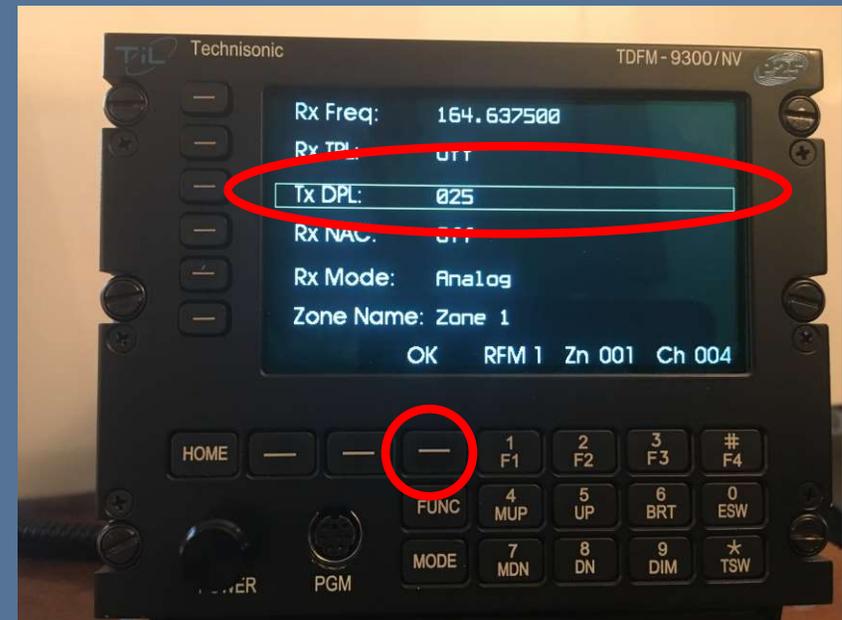
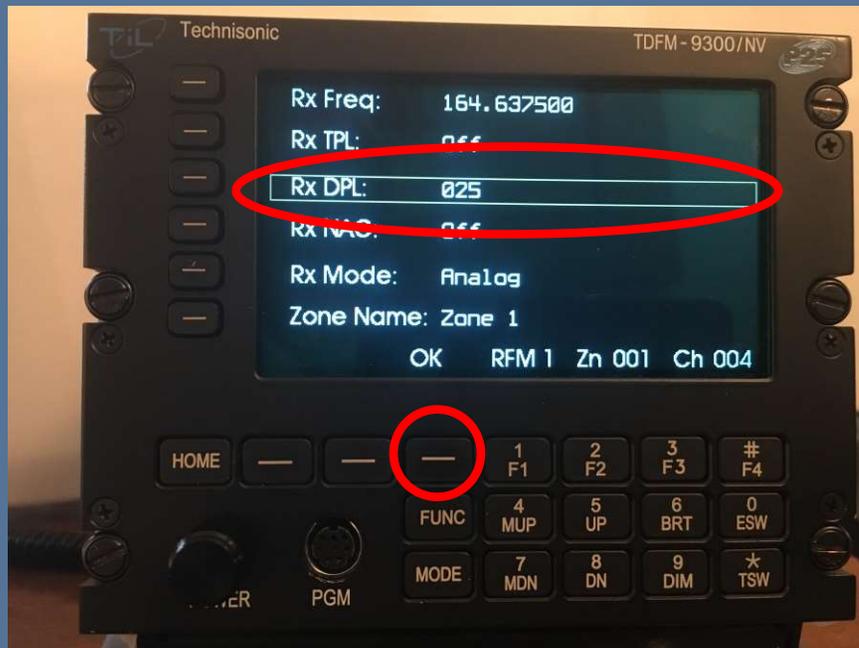
You MUST press the “OK” softkey in order for the data to be stored!!!!

TDFM 9000 OPERATION



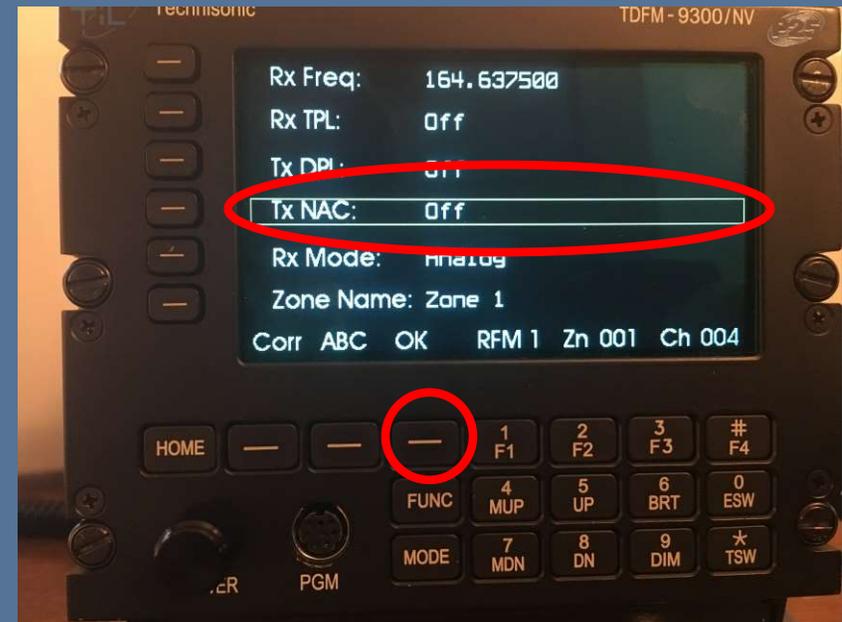
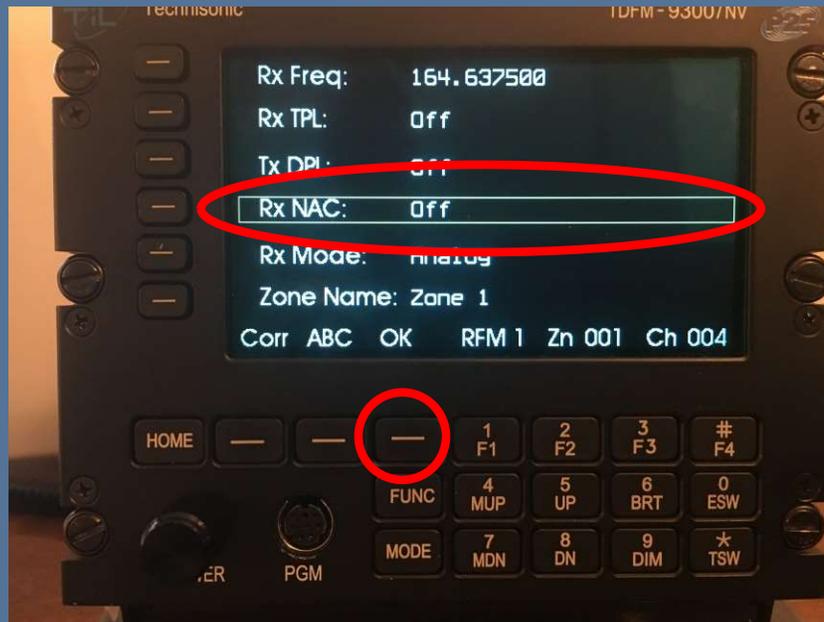
- “RX TPL” (Tone Private Line), If required to add, push corresponding side button and rotate the knob for the desired PL tone, then press “OK” to accept and it will switch over to “TX TPL”. Again rotate knob for desired PL tone, then press “OK” to accept.

TDFM 9000 OPERATION



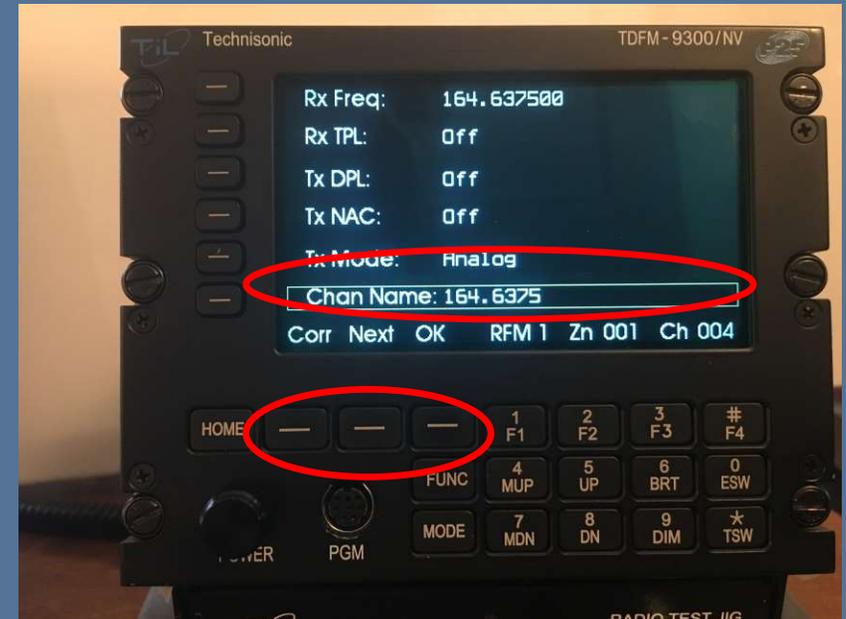
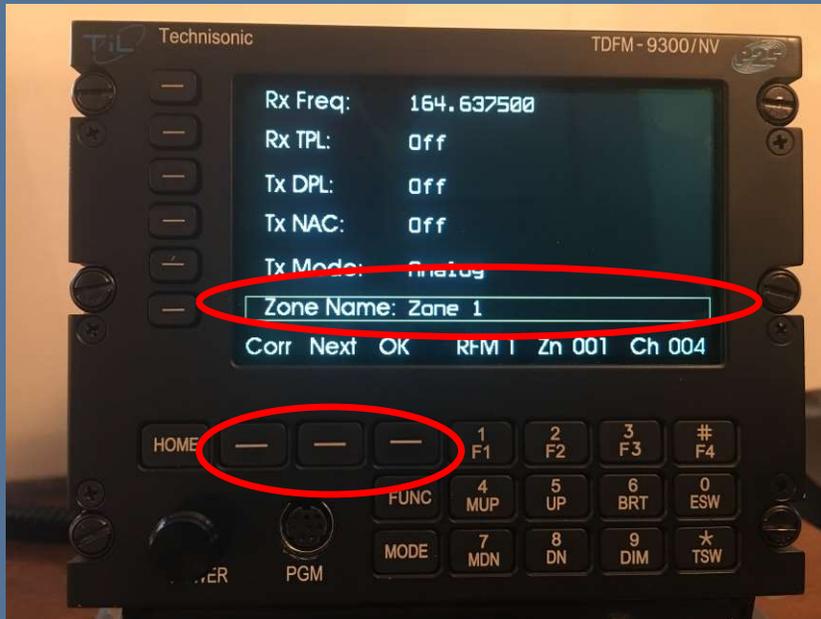
- “RX DPL” (Digital Private Line), If required to add, push corresponding side button and rotate the knob for the desired PL tone, then press “OK” to accept and it will switch over to “TX DPL”. Again rotate knob for desired PL tone, then press “OK” to accept.

TDFM 9000 OPERATION



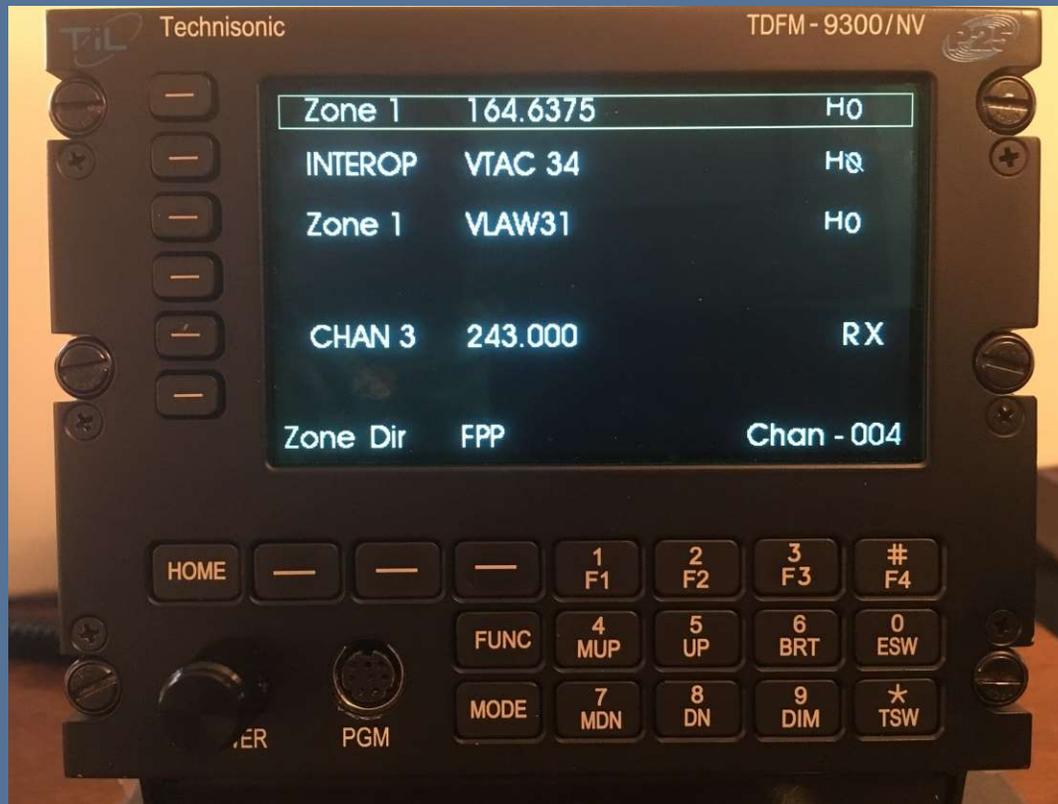
- If a NAC (Network Access Code) is desired, Push the corresponding button for RX NAC, then rotate the knob for the 3 digit hexadecimal number. Then click “OK” to accept. Repeat for TX NAC

TDFM 9000 OPERATION



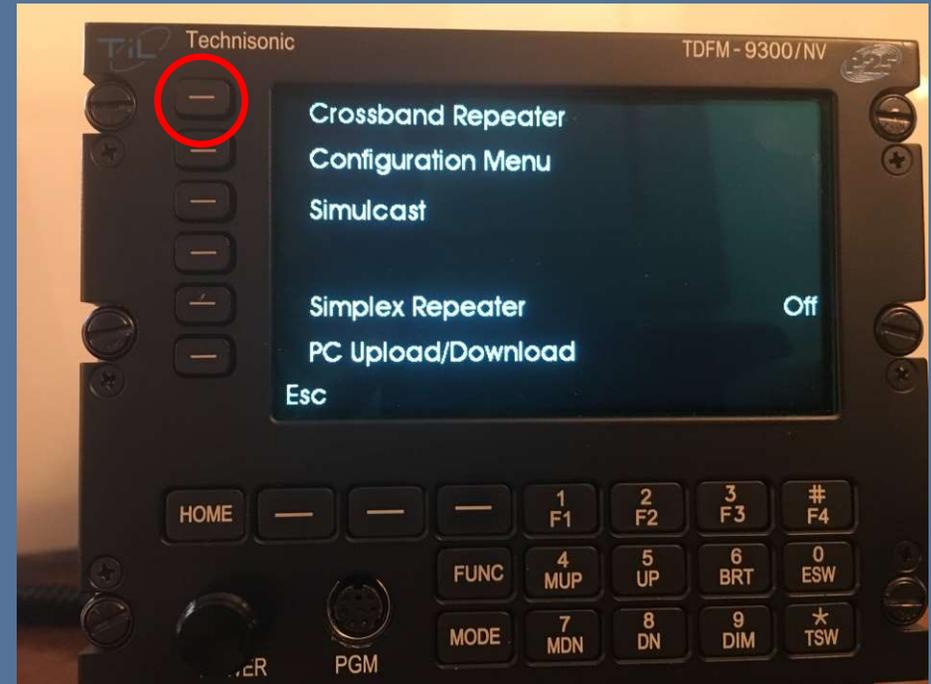
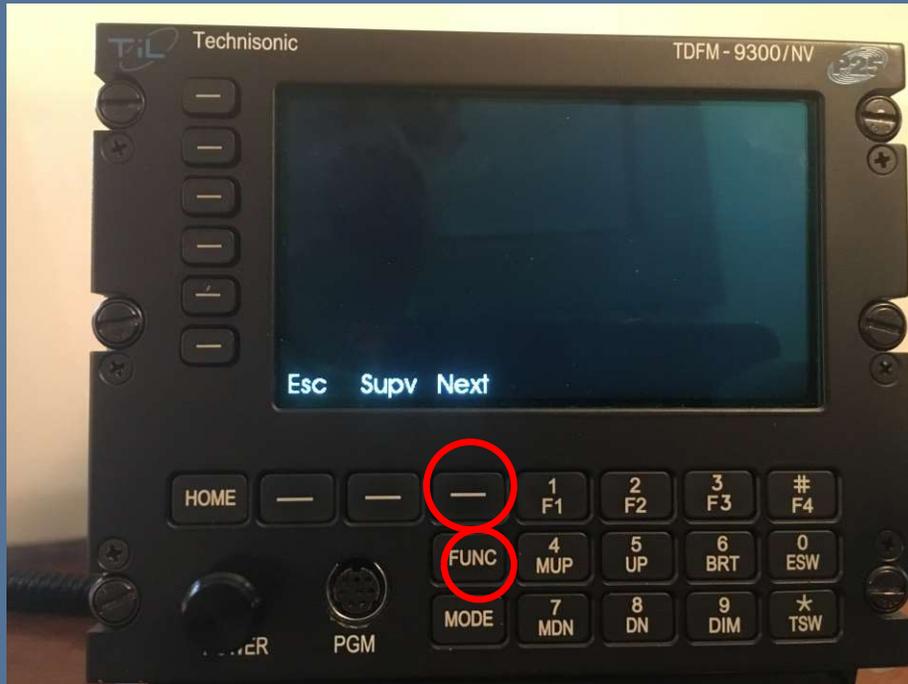
- If wanting to change the Zone name, Rotate the knob to change A,B...1,2..., Then press the next key to advance to the next position. Once complete, hit the “OK” soft key- **Advise not changing Zone Name**
- Push the Button next to “Zone Name” to proceed to “Chan Name”. Repeat the previous steps to change the “Chan Name”. Once complete, Hit the “OK” soft key

TDFM 9000 OPERATION



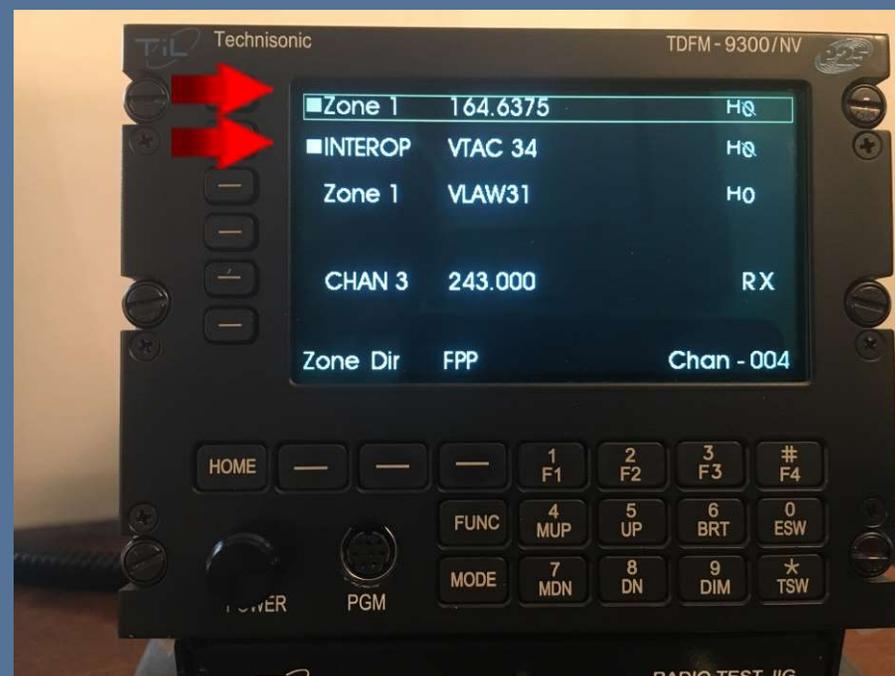
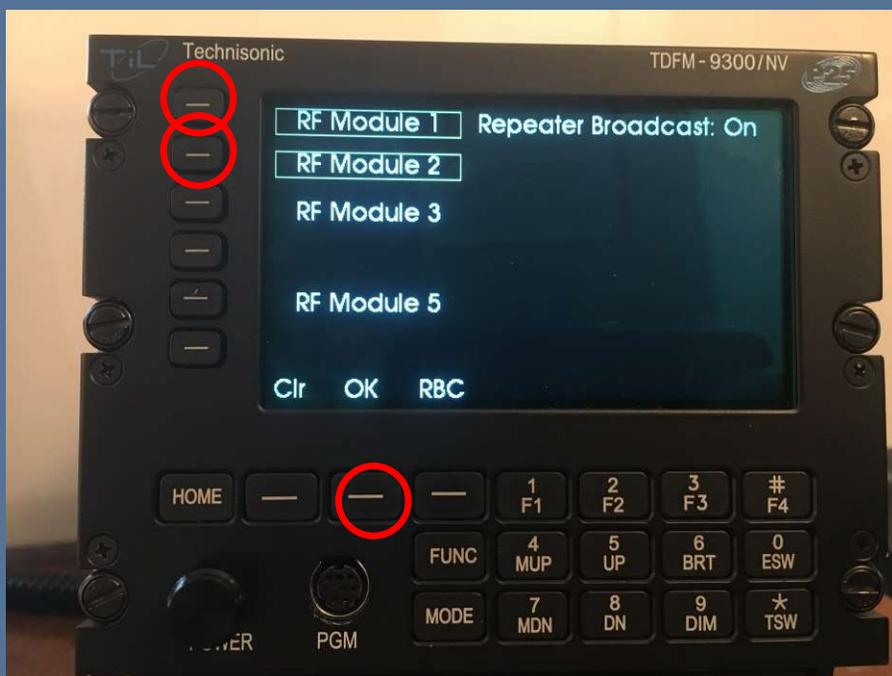
- You can select any two modules to cross band repeat. The repeat function is semi-duplex. This means the radio will retransmit from one module to another in both directions but not simultaneously. This is between modules not bands within the same module.

TDFM 9000 OPERATION



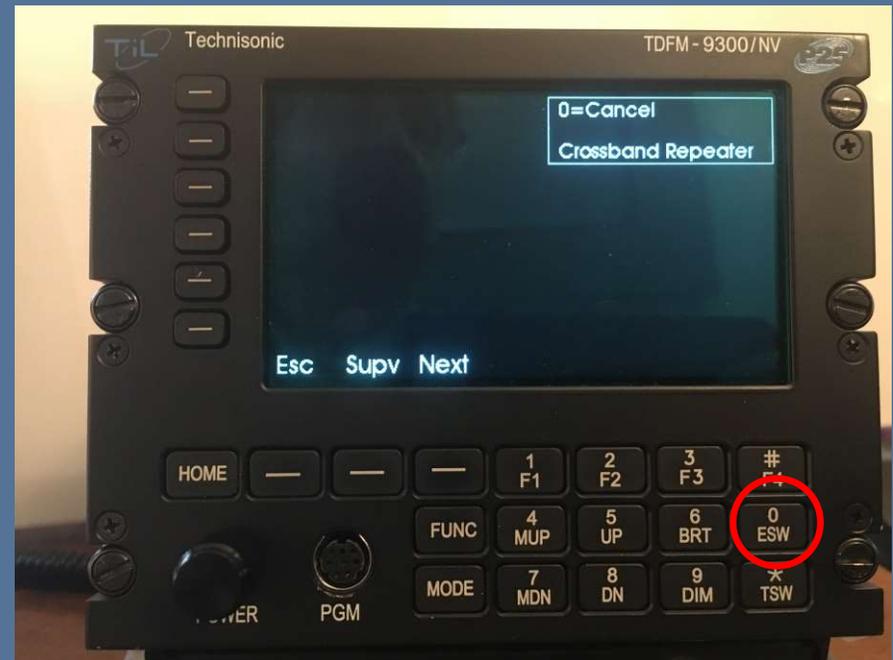
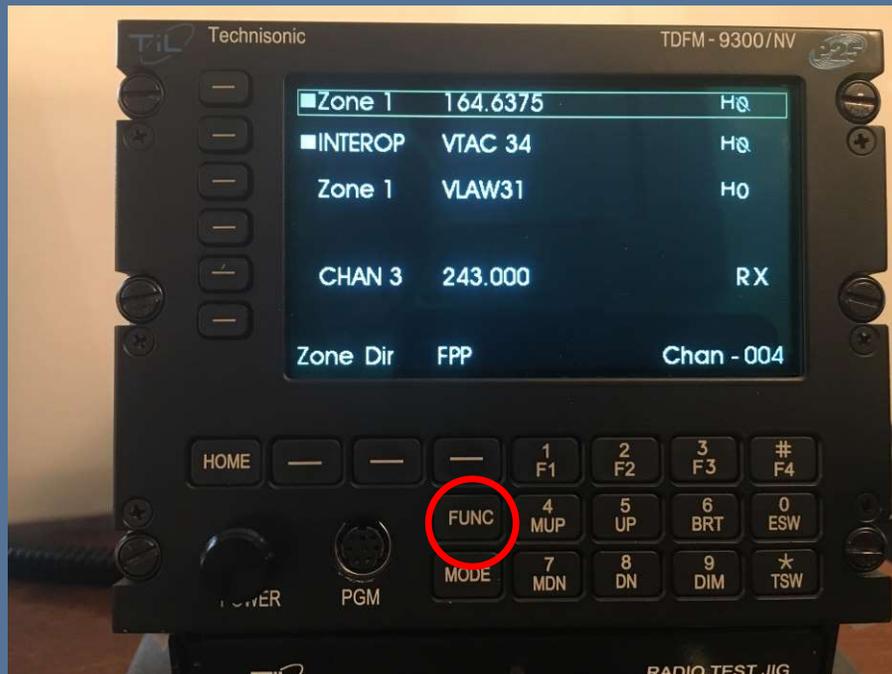
- To select Crossband Repeat, Press the "Func: key, then press the "Next" key.

TDFM 9000 OPERATION



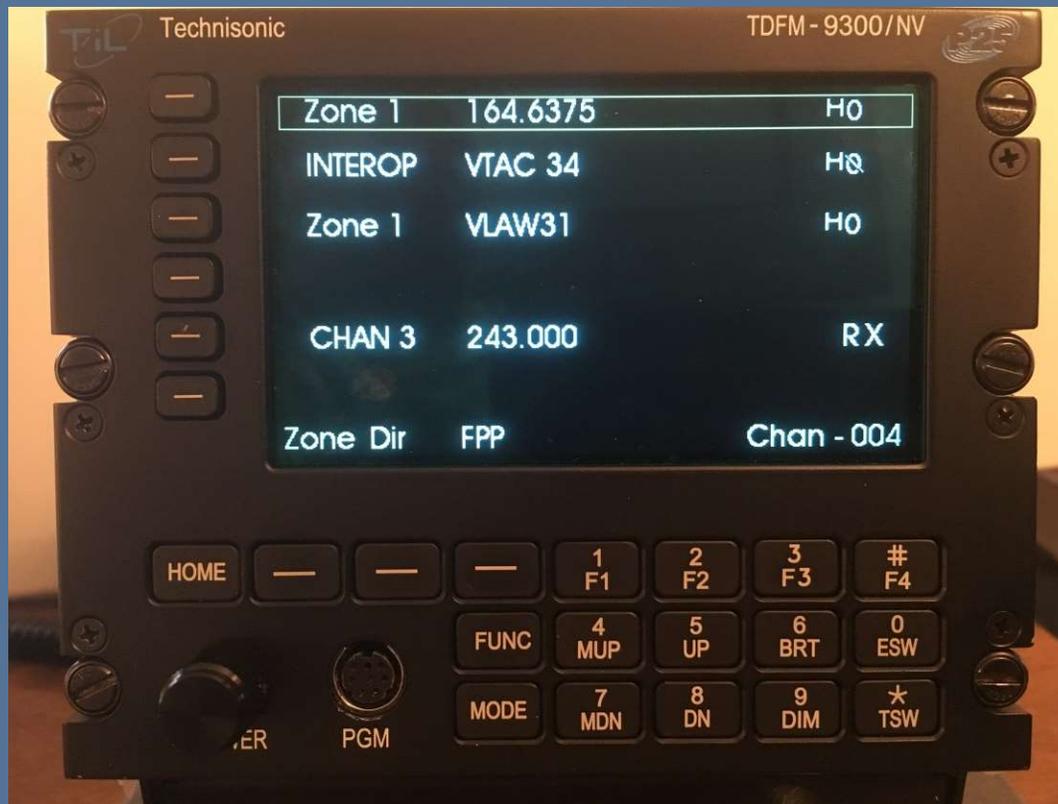
- Press the “Cross-band Repeater” button, Then select the two modules to be cross-banded, then press “OK”. Two solid squares will display next the modules selected.

TDFM 9000 OPERATION



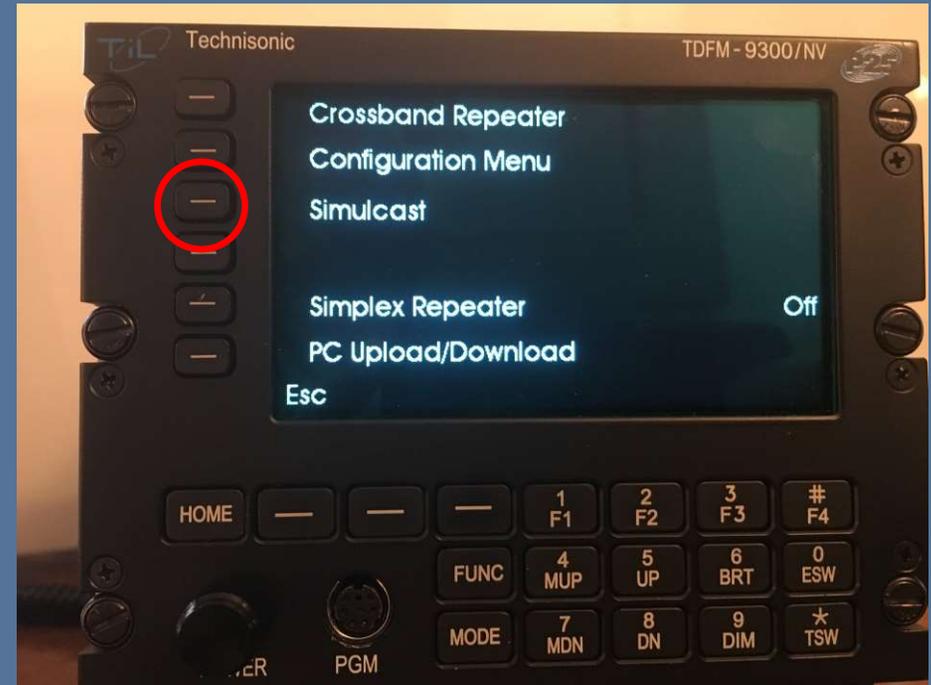
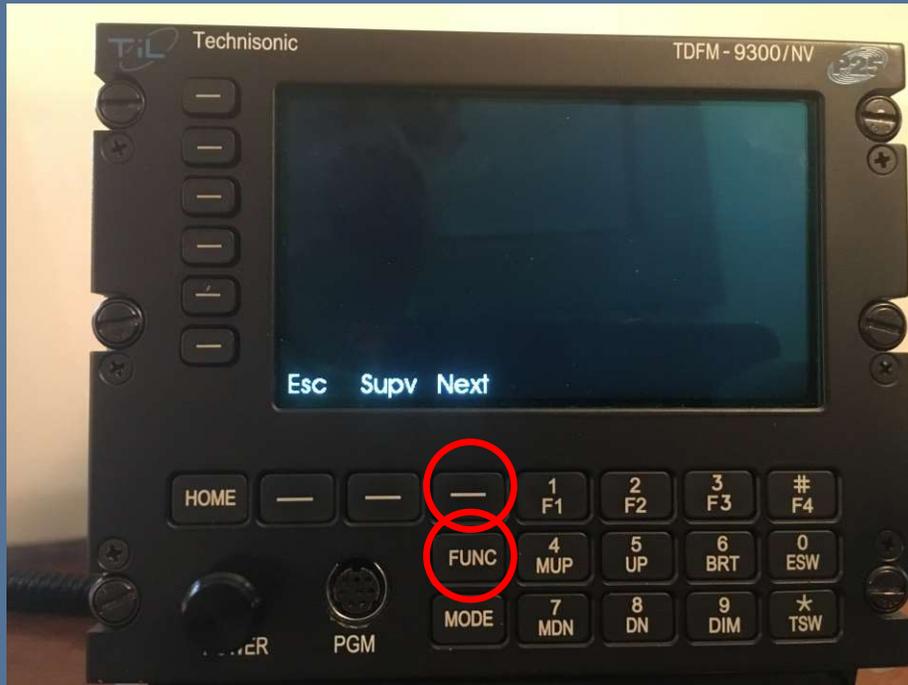
- To clear Crossband Repeat, press the “FUNC” key. Then press the “ZERO” key to cancel the mode.

TDFM 9000 OPERATION



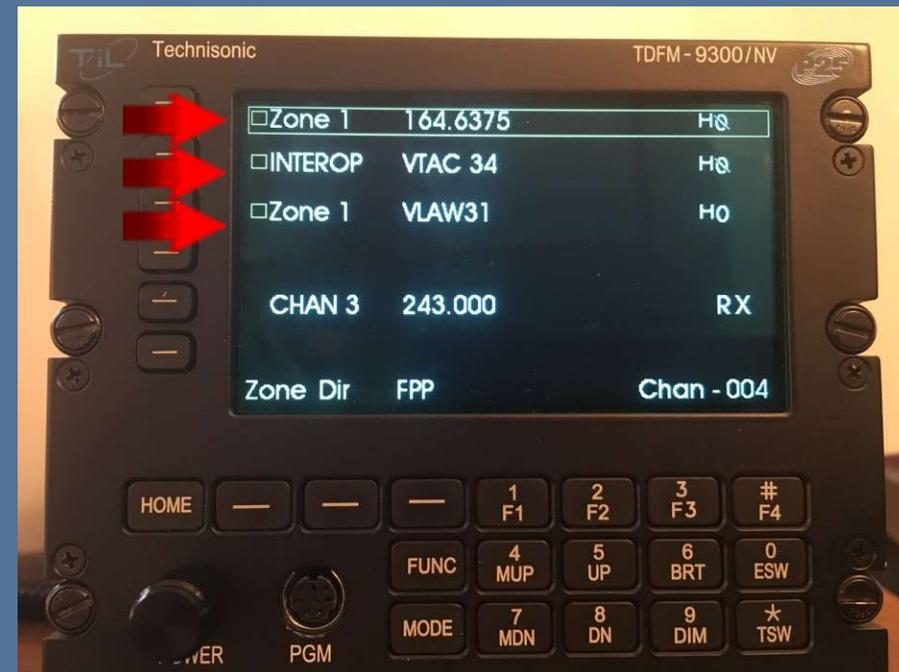
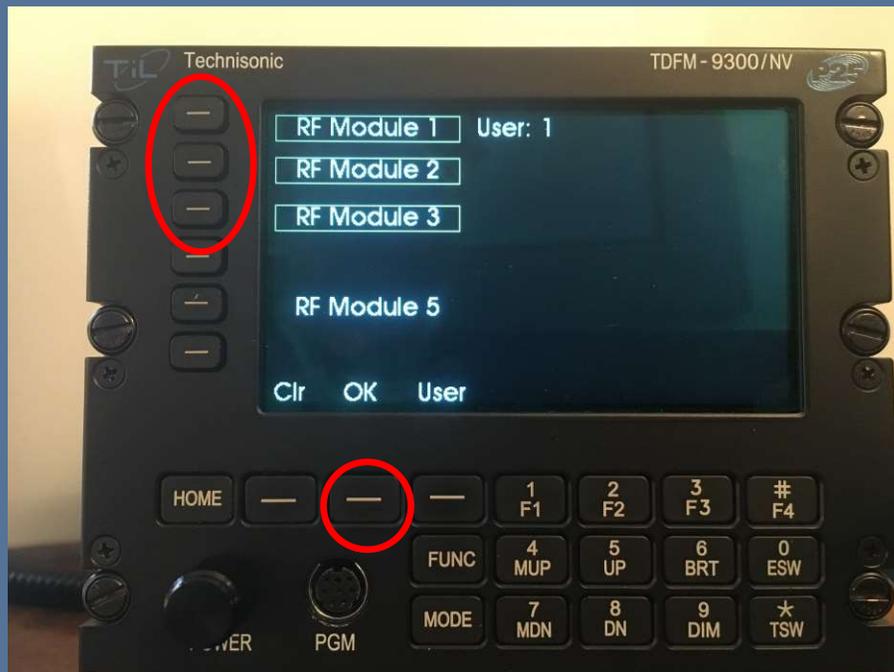
- You can select 2 or more modules to transmit simultaneously. Simulcast is only available when using the one or both of the combined input/outputs. Simulcast can be used in conjunction with the cross band repeat mode

TDFM 9000 OPERATION



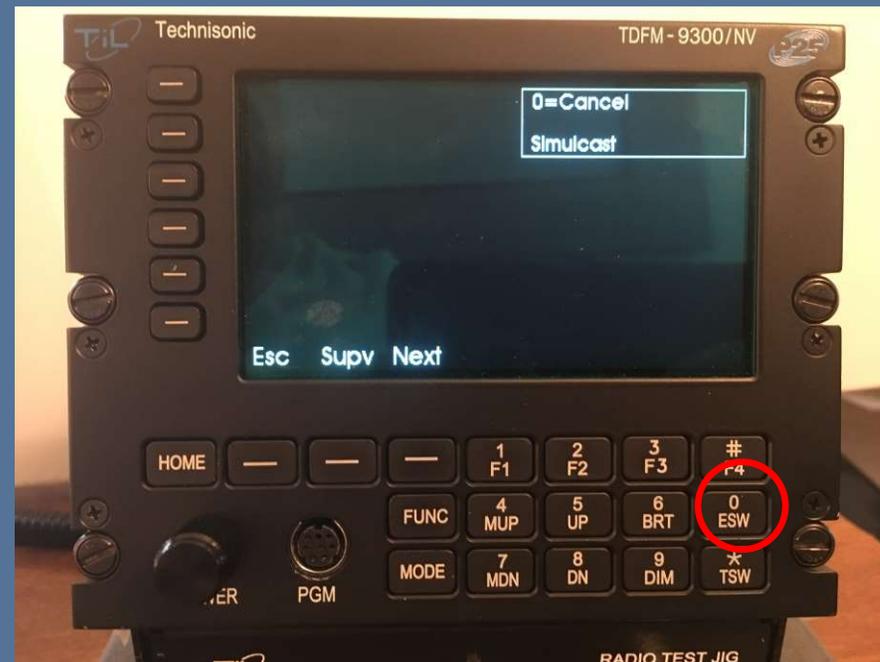
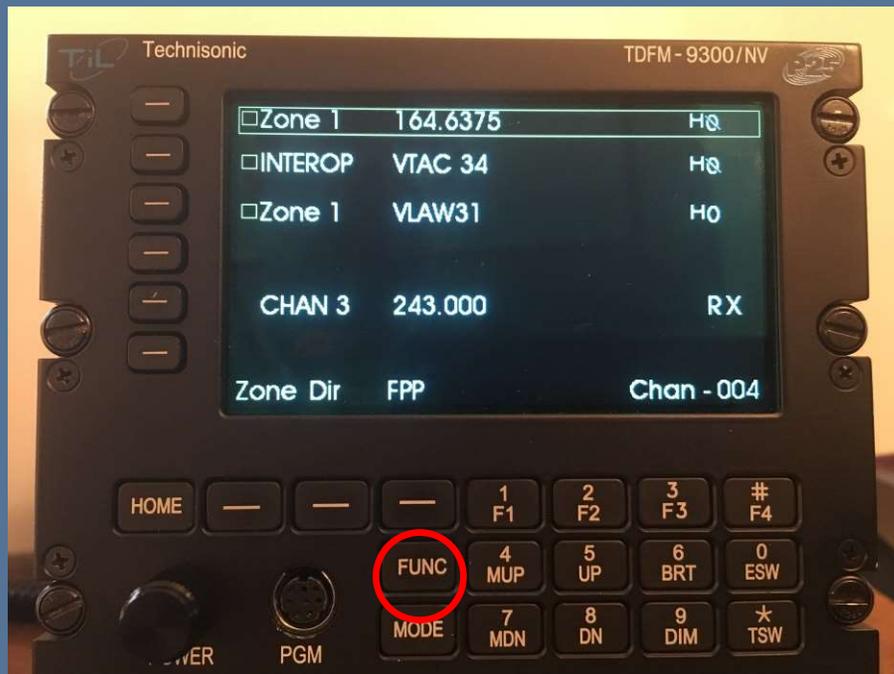
- To select “Simulcast”, Press the “FUNC” key, then press the “Next Key

TDFM 9000 OPERATION



- Press the “Simulcast” button, then select the “Modules” to be simulcast on, then press “OK”. Hallow Squares will appear next to the selected modules.

TDFM 9000 OPERATION



- To clear Simulcast, press the “FUNC” key. Then press the “ZERO” key to cancel the mode.



Builds and Capabilities

TDFM 9000 OPERATION

CPS Customer Programming Software



Intro to Motorola CPS

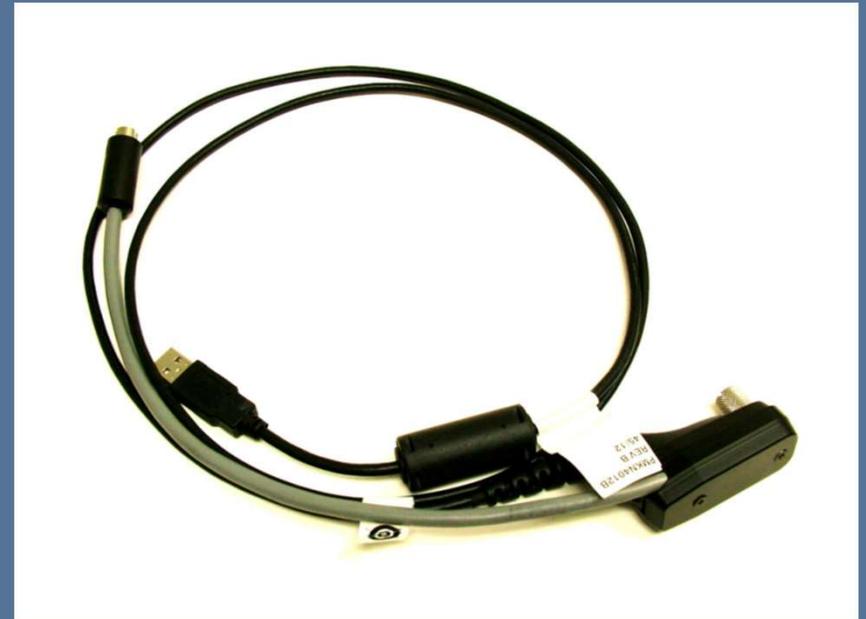


CPS Programming - 101



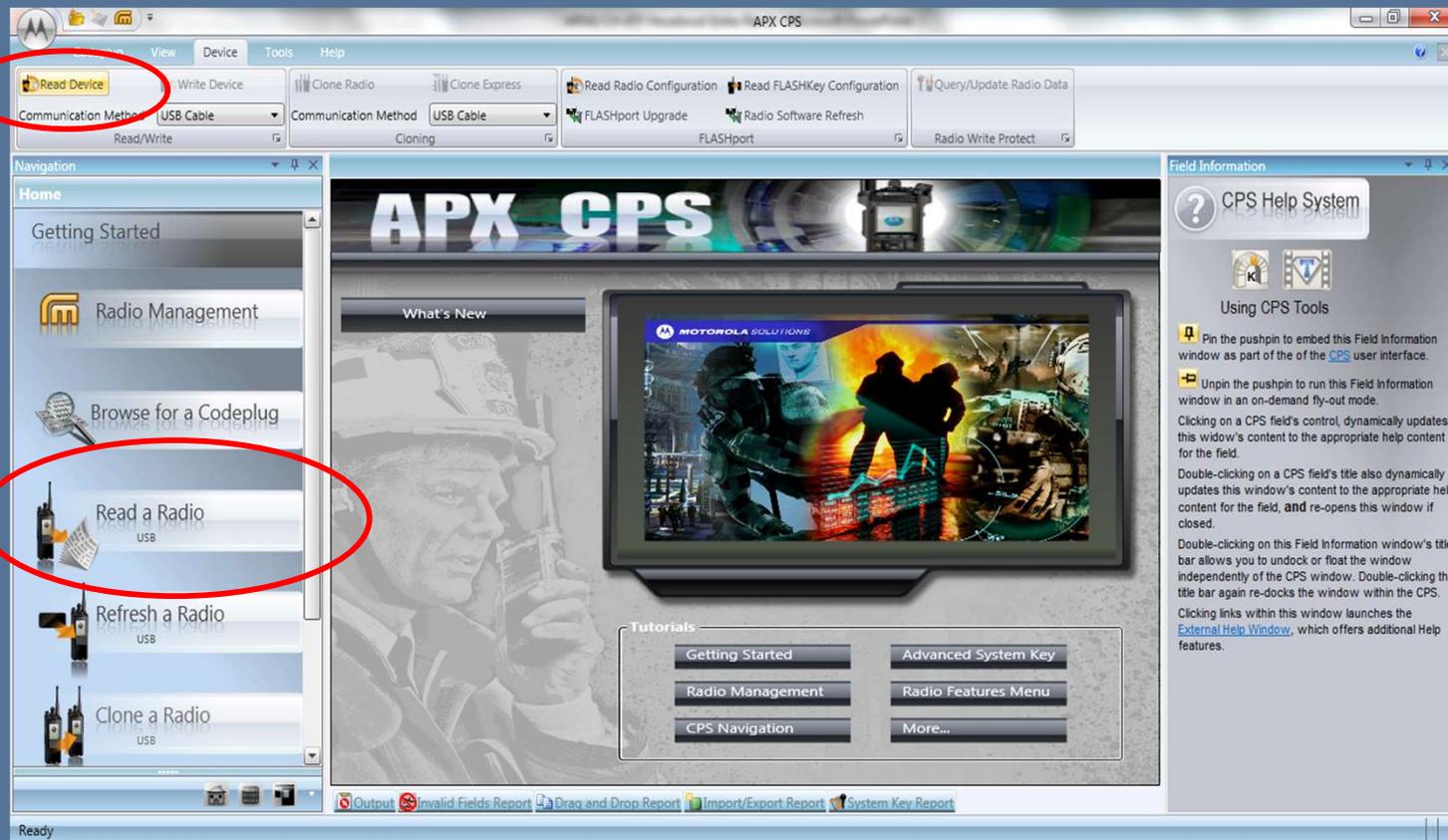
- Motorola modules must be programmed with a program called “APX CPS” which stand for “APX Customer Programming Software”.
- Revision of CPS is VERY IMPORTANT. Once a module is programmed with a revision of CPS, you cannot program it with an older revision of CPS!!!!

CPS Programming – Read a Module



- Power-up the TDFM-9000.
- Connect the cable (TiL P/N 127499 “PC-9000 “) between the programming port on the front of the TDFM-9000 and your computer.
- Select which band you want to read by pressing one of the band select soft buttons.

CPS Programming – Read a Module



- Select “Read a Radio” button on the CPS opening page or “Read Device” under the Device tab (both highlighted above) then follow additional instructs of CPS to start the process.
- TDFM-9000 band selected for reading will display “Programming” once the process begins
- CPS will indicate the status of the process.

!!!!Warning!!!!

Do NOT unplug the cable during a CPS Read or Write Operation – bad things can happen to the module

CPS Programming – Read a Module

The screenshot displays the APX CPS (Portable) software interface. The title bar reads "APX CPS (Portable) - 9000 800 mhz original version rev 1.mc". The main window is divided into several panes:

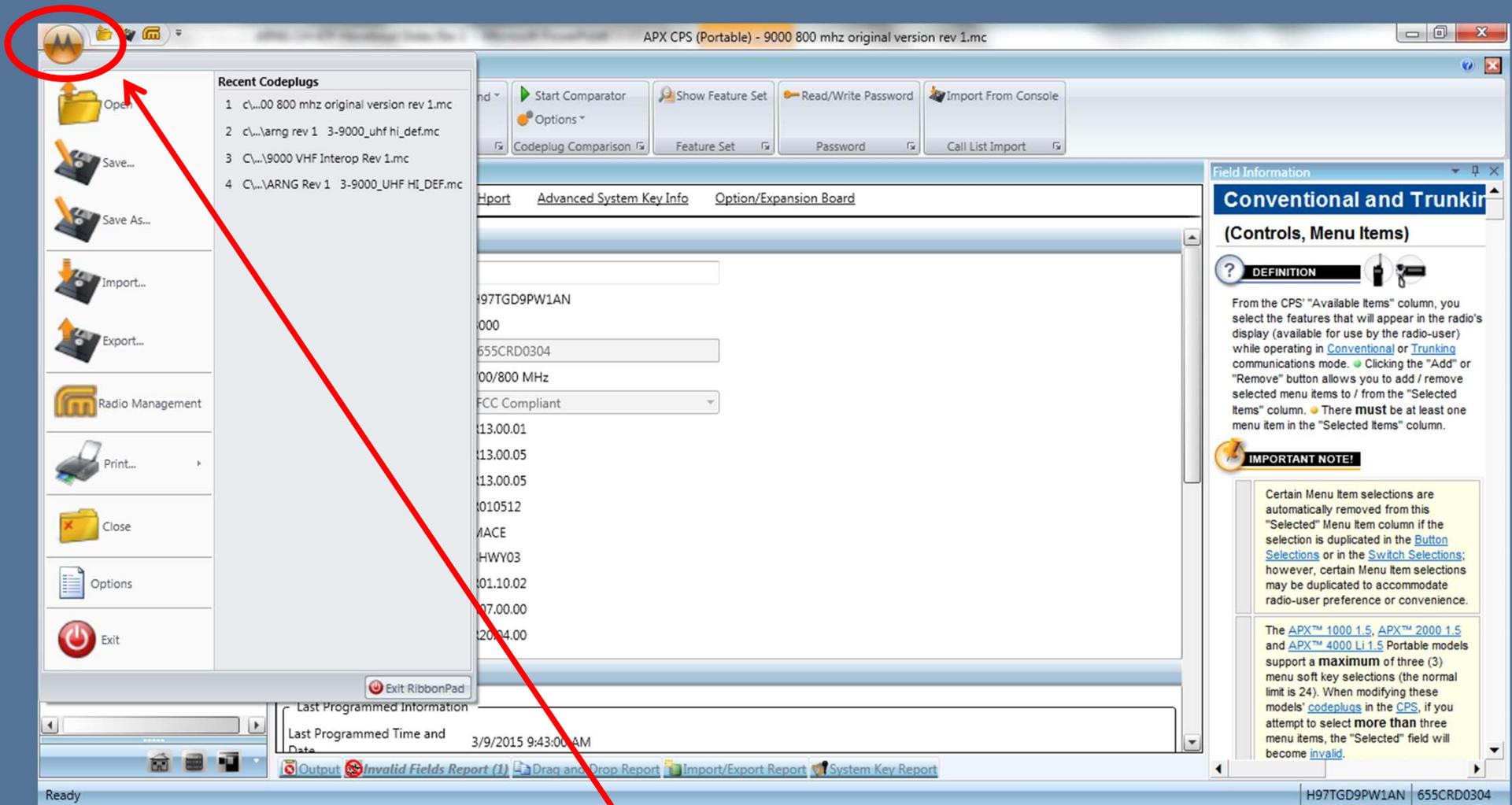
- Codeplug Configuration:** A tree view on the left showing the configuration structure for the 655CRD0304 module, with "Conventional Configuration" selected.
- Radio Information:** The main central pane, currently showing the "General" tab. It displays various fields and their values:

Field	Value
Codeplug Alias	
Model Number	H97TGD9PW1AN
Maximum Channels	3000
Serial Number	655CRD0304
Primary Frequency Band	700/800 MHz
Regional Governance	FCC Compliant
Codeplug Version	R13.00.01
Firmware Version	R13.00.05
DSP Version	R13.00.05
Secure Version	R010512
Secure Hardware Type	MACE
Secure Hardware Version	SHWY03
Tuning Version	R01.10.02
PSDT Version	R07.00.00
Bootloader Version	R20.04.00
- Field Information:** A pane on the right titled "Conventional and Trunking (Controls, Menu Items)". It contains a "DEFINITION" section with text explaining how to select features for the radio's display. Below this is an "IMPORTANT NOTE!" section with a yellow background, stating that certain menu item selections are automatically removed and duplicated in other columns, and that APX models support a maximum of three menu soft key selections.

The status bar at the bottom shows "Ready" on the left and "H97TGD9PW1AN 655CRD0304" on the right. A taskbar at the bottom of the window includes icons for "Output", "Invalid Fields Report (1)", "Drag and Drop Report", "Import/Export Report", and "System Key Report".

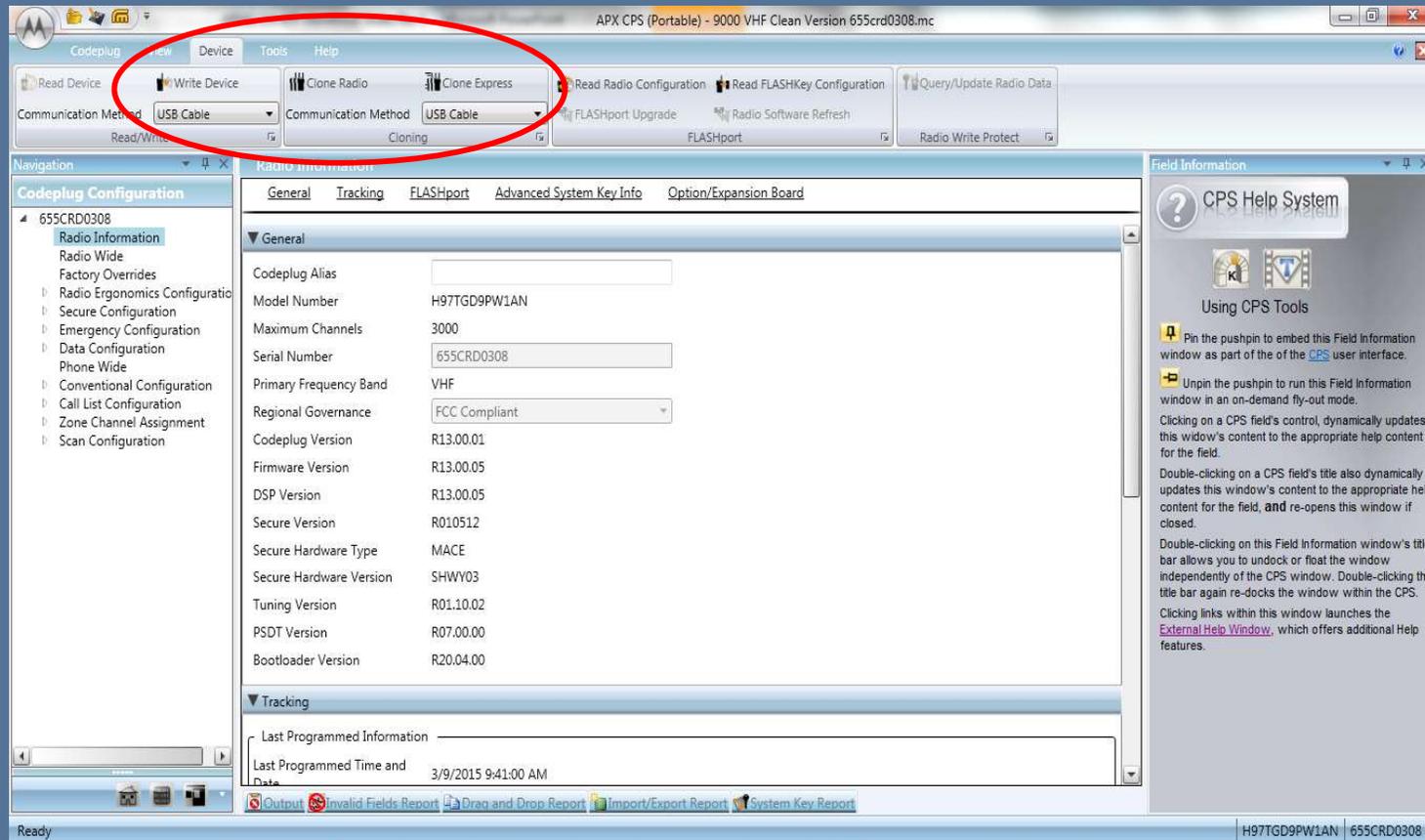
- When the read process is complete, CPS will display something similar to the above. The codeplug is now ready to be modified.

CPS Programming – Saving Codeplug



- To save a Codeplug after reading or after making changes, click on the “M” button and select “Save” or “Save As”.

CPS Programming – Write to a Module

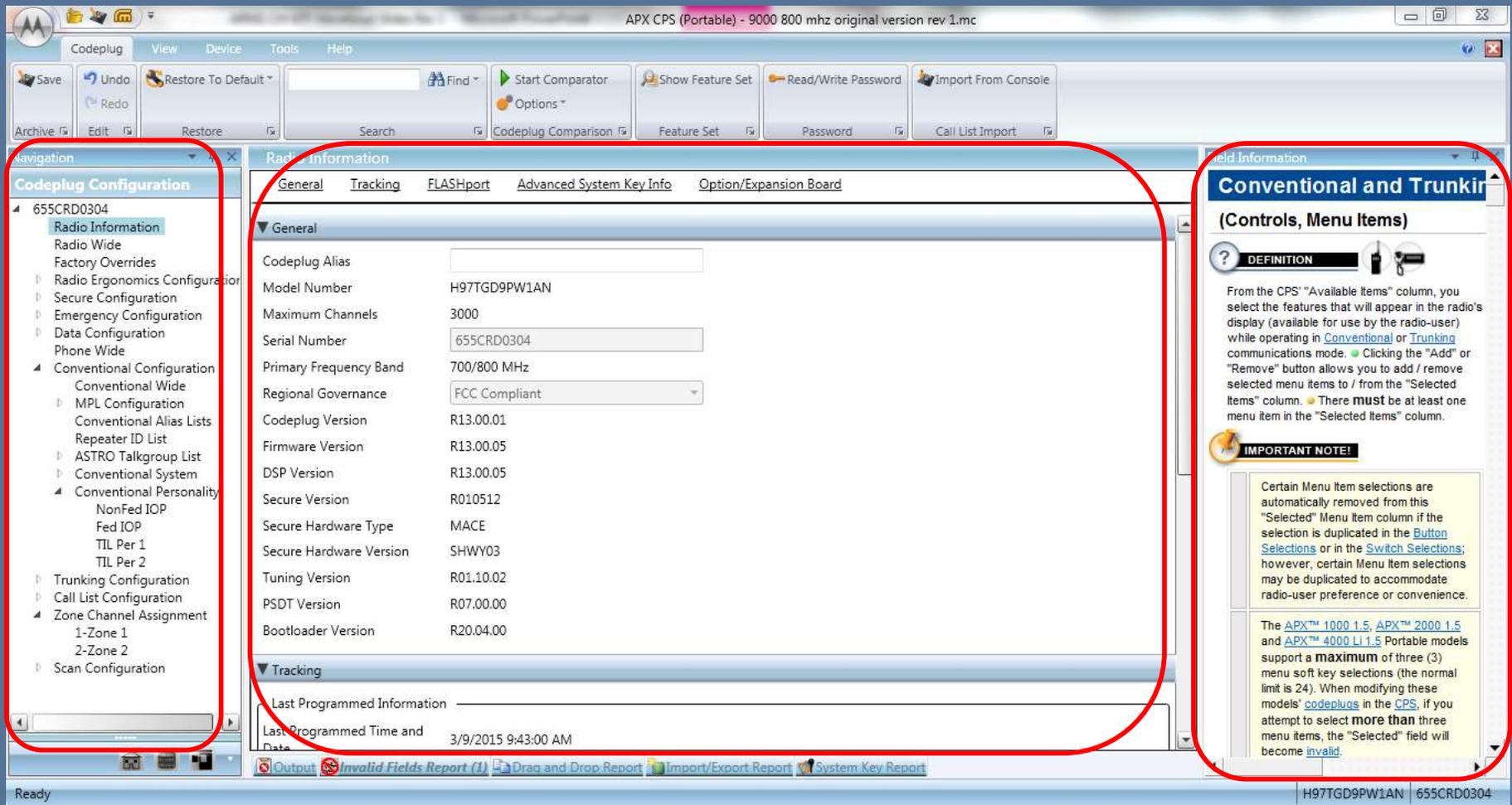


- To write a codeplug into a module, on the “Device” tab either select “write”(if the codeplug is originally from the module, or “Clone” or “Clone Express” if the codeplug is going into a different module.
- TDFM-9000 band selected for reading will display “Programming” once the process begins and CPS will indicate the status of the process.

!!!!Warning!!!!

Do NOT unplug the cable
during a CPS Read or Write
Operation

CPS Programming – Screenology

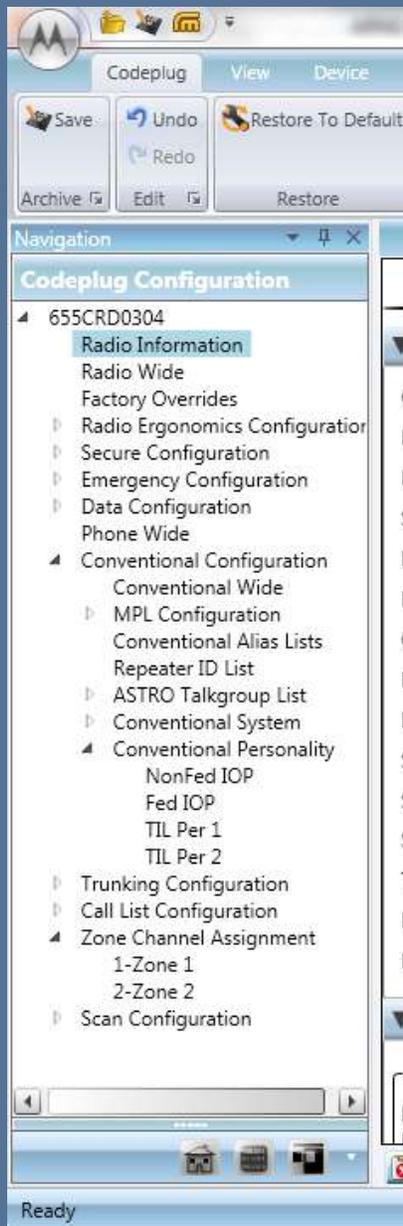


Configuration Tree

Codeplug Information

Help Information

CPS Programming – Configuration Tree

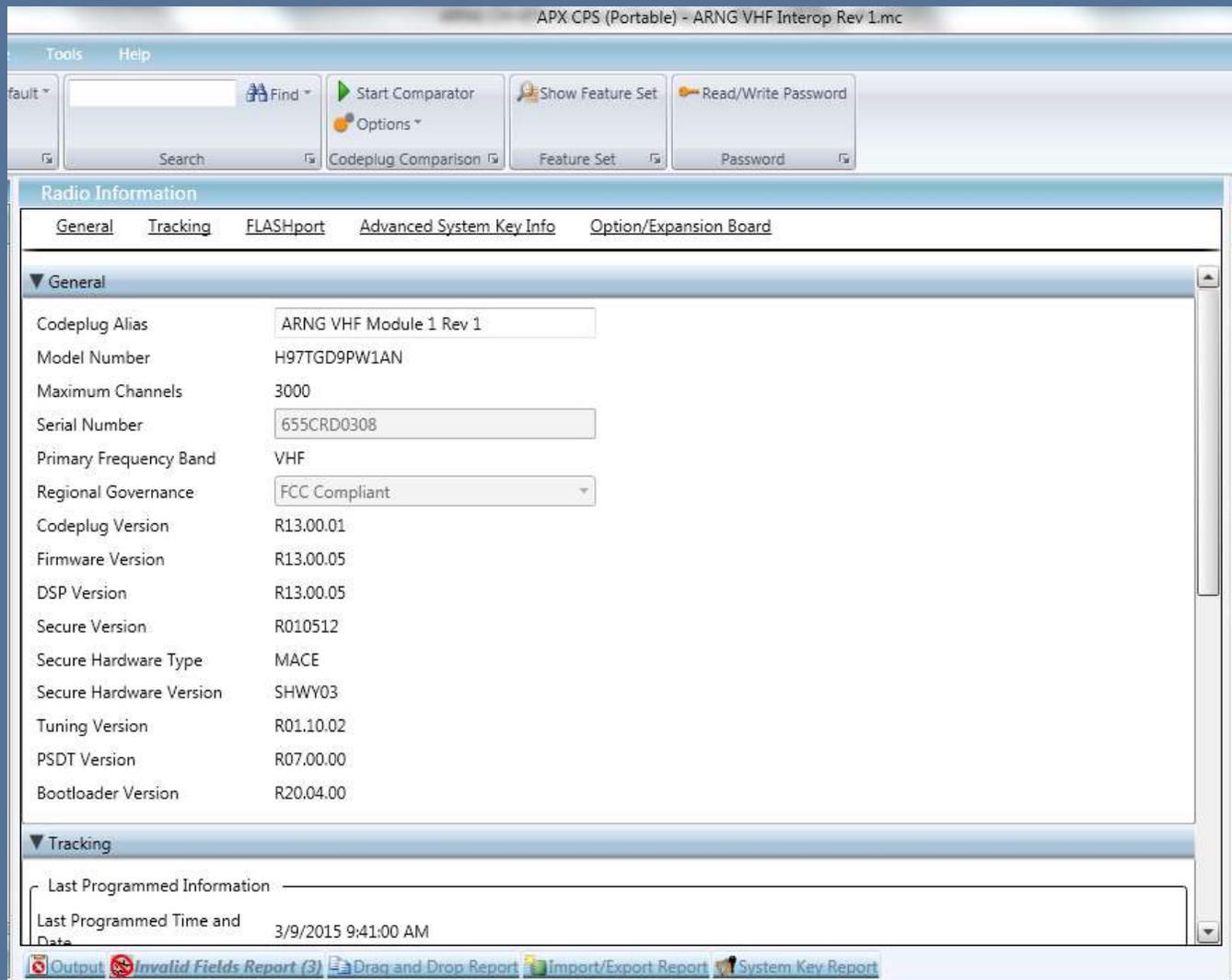


The Configuration Tree window lists all the major sections of the codeplug. If you click on one of the sections, it causes the Data Information window to display the info for that section.

To add, delete, or rearrange preset channels, you will need to access the “Personality” and “Zone Channel Assignment” nodes.

Other nodes are usually “set and forget”. However, if a codeplug is ever sent out to another programmer, you need to check that they didn’t mess with anything they shouldn’t have like Buttons and soft menu items.

CPS Programming – Radio Information Window

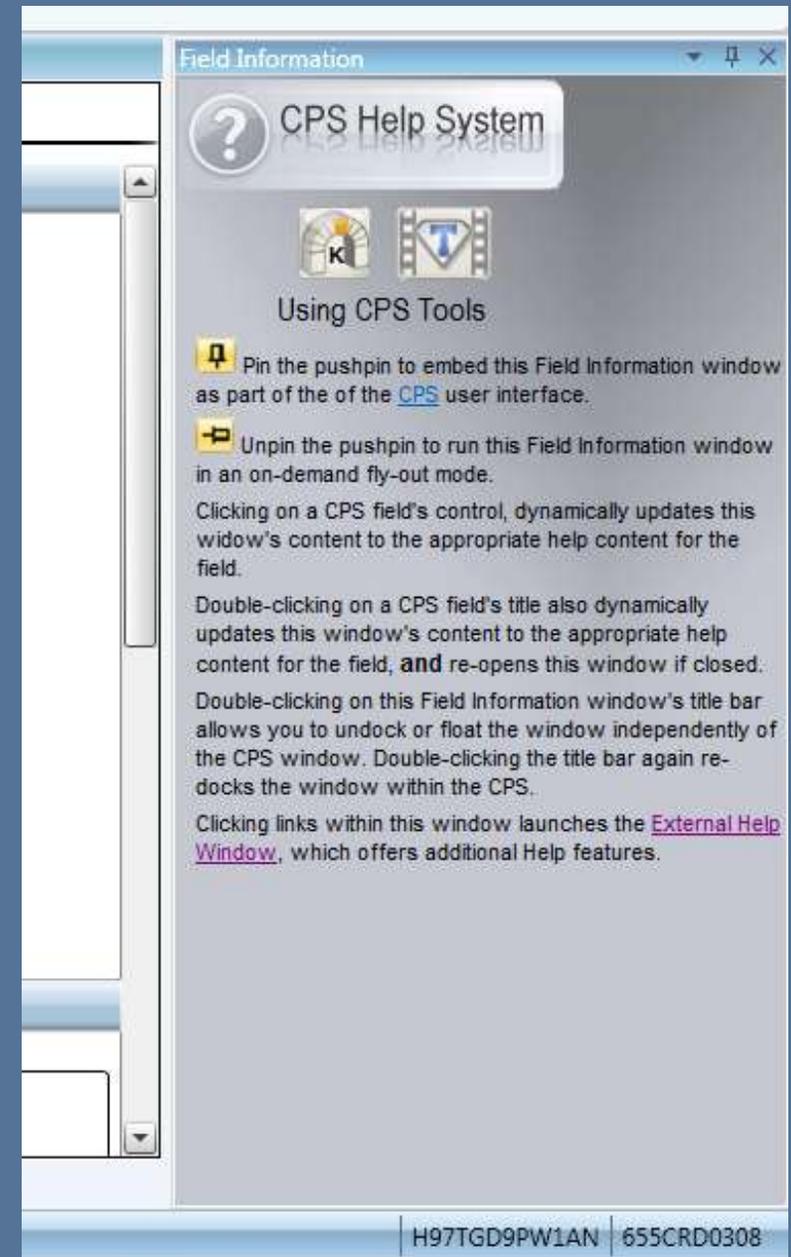


Radio Information window displays the data contained in the node that is selected in the Configuration Tree. This is where you input the actual information into the program.

CPS Programming – Field Information Window

Field Information window displays Help information associated with the field your cursor is on in the Radio Information window.

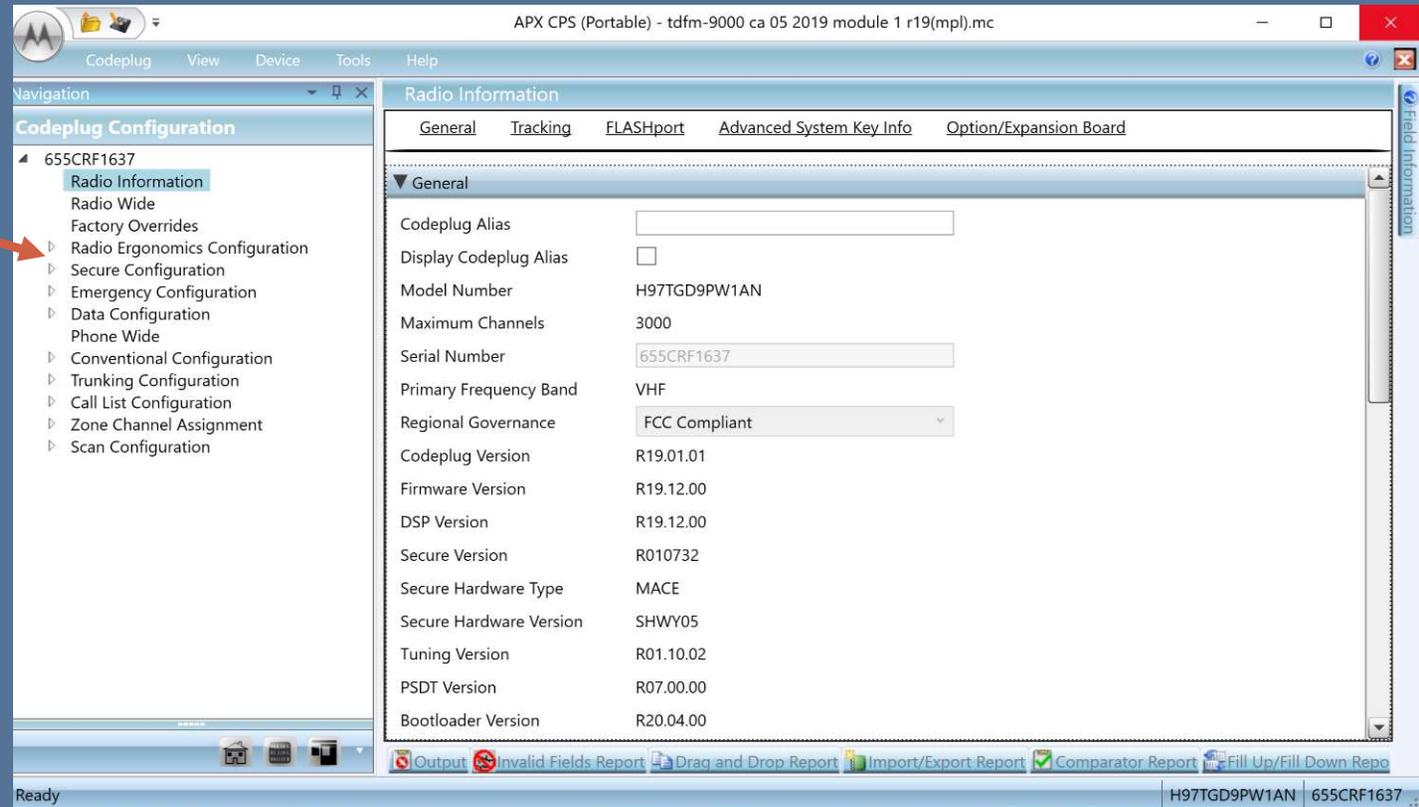
If you want to know more about the field your cursor is located, look over in this window and it will tell you all about the field. It also has links to other terms that may help you figure out what you need to do.



Radio Ergonomics -

Radio Ergonomics

Allows you to customize the Buttons, Switches and Menu items to support your specific needs and functionality



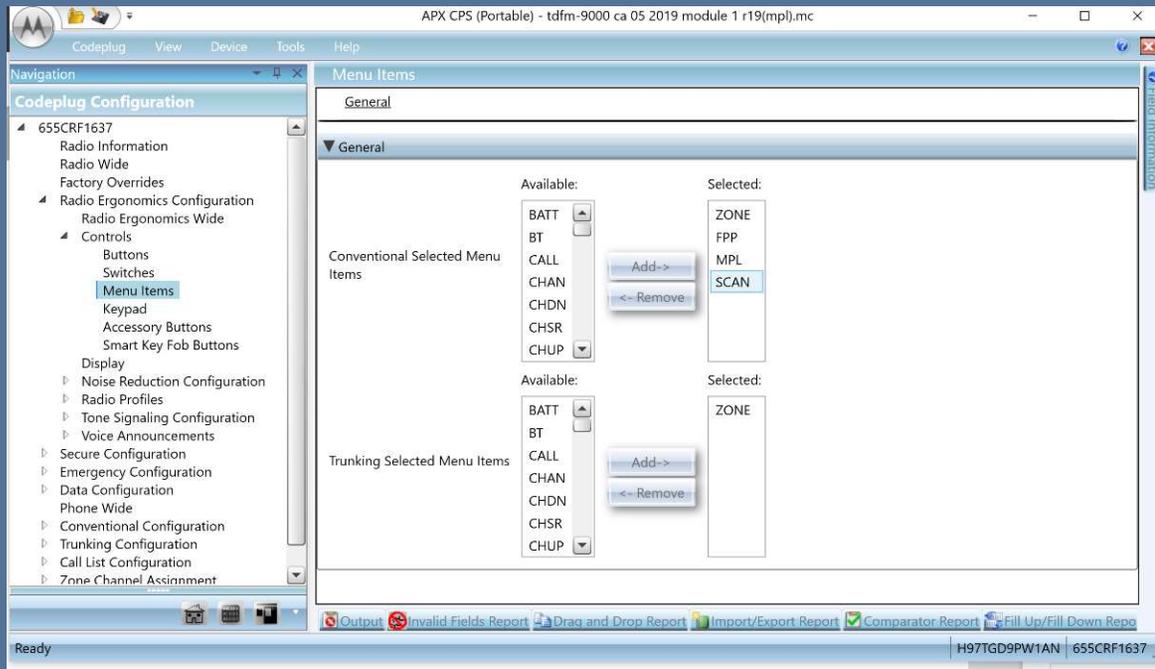
The screenshot displays the APX CPS (Portable) software interface. The window title is "APX CPS (Portable) - tdfm-9000 ca 05 2019 module 1 r19(mpl).mc". The interface is divided into several sections:

- Navigation:** A tree view on the left under "Codeplug Configuration" for device "655CRF1637". The "Radio Ergonomics Configuration" item is selected and highlighted with an orange arrow.
- Radio Information:** A tabbed interface on the right with tabs for "General", "Tracking", "FLASHport", "Advanced System Key Info", and "Option/Expansion Board". The "General" tab is active, showing a list of configuration parameters:

Parameter	Value
Codeplug Alias	
Display Codeplug Alias	<input type="checkbox"/>
Model Number	H97TGD9PW1AN
Maximum Channels	3000
Serial Number	655CRF1637
Primary Frequency Band	VHF
Regional Governance	FCC Compliant
Codeplug Version	R19.01.01
Firmware Version	R19.12.00
DSP Version	R19.12.00
Secure Version	R010732
Secure Hardware Type	MACE
Secure Hardware Version	SHWY05
Tuning Version	R01.10.02
PSDT Version	R07.00.00
Bootloader Version	R20.04.00

The bottom status bar shows "Ready" on the left and "H97TGD9PW1AN | 655CRF1637" on the right. A taskbar at the bottom contains icons for "Output", "Invalid Fields Report", "Drag and Drop Report", "Import/Export Report", "Comparator Report", and "Fill Up/Fill Down Repo".

Essential Elements – Soft Keys



MENU Items

Menu Items are displayed as the SOFT KEYS on the TDFM Series radio.

Soft keys are ideal to access common functions such as Zone, FPP, Scan, Pwr, Mute and Info

Keys Are shown in order 3 at a time, to cycle simply press the 5 (*up*) or 8 (*dn*) buttons.

Essential Elements – Buttons

Buttons

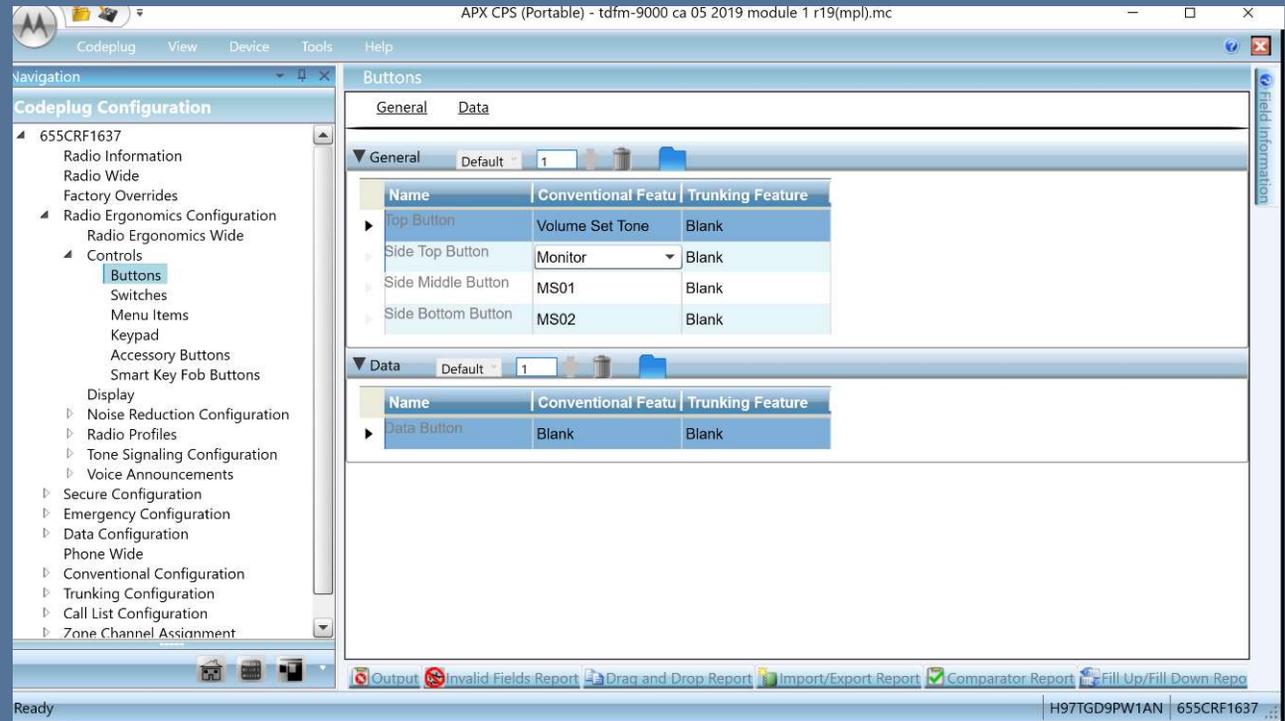
Button Settings utilized on the radio are *the F1, F2, F3, F4 keys*

Side Top Button = F1
(Monitor, opens the receive PL Tone)

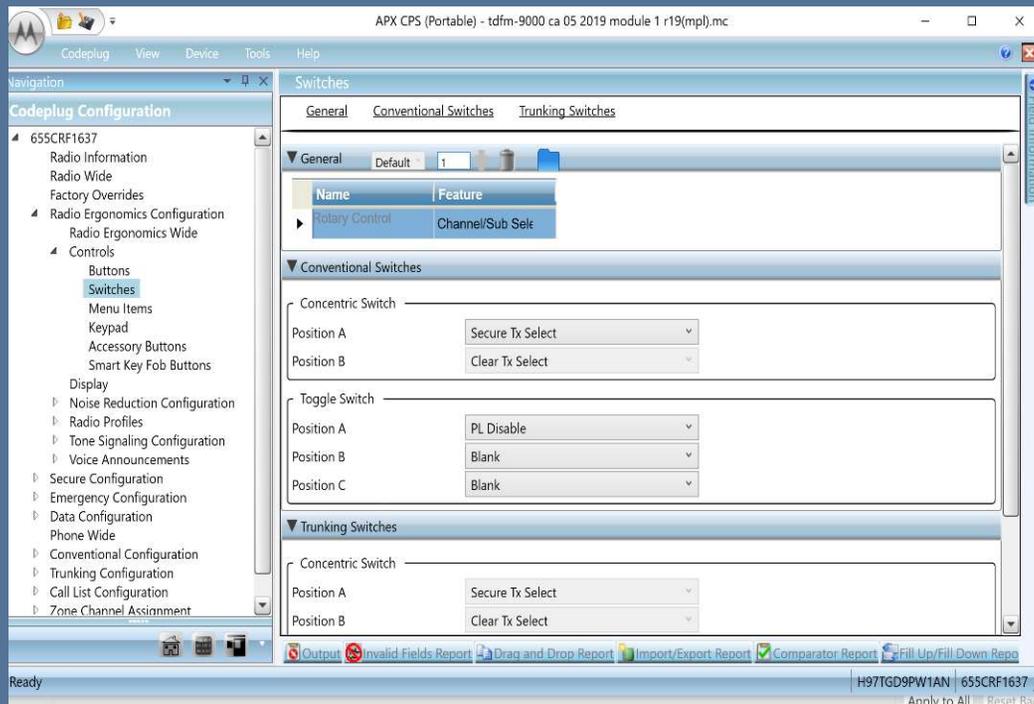
Top Button = F4
(Vol Set Tone)

Side Middle Button = F2
(MS01 Quick Save)

Side Bottom Button = F3
(MS02 Quick Save)



Essential Elements – Switches



Switches – ESW / TSW

The Concentric Switch

Position A and Position B are most commonly utilized to Access Encryption and are via the ESW or the 0 key on the TDFM.

Toggle Switches are accessed Via the TSW or * key and are displayed as position A, B, or C. These switches are easily overlooked by Crew in high workload environments, Careful consideration should be exercised prior to their programming.

Essential Elements - Hidden Dangers



BEWARE: Some commonly selected options hold a hidden danger –

THEY ARE GLOBAL IN NATURE: With NO indication of their selection shown on the display

These options while selected on a channel basis, Revert all channels on that module to the selected feature:

DIR - Direct or Talk Around - Selecting DIR will place ALL REPEATER CHANNELS into the DIRECT MODE –

PL TONE DISABLE: All PL Tones will be disabled on that module;

CPS Programming - Programming a Channel

Step 1: Select a Personality in the Navigation Window



CPS Programming - Programming a Channel

Step 1: Select a Personality

```
graph TD; A[Step 1: Select a Personality] --> B[Step 2: Input Frequency Options]; B --> C[Step 3: Assign the Frequency to a Zone and Channel];
```

Step 2: Input Frequency Options

Step 3: Assign the Frequency to
a Zone and Channel

CPS Programming - Programming a Channel

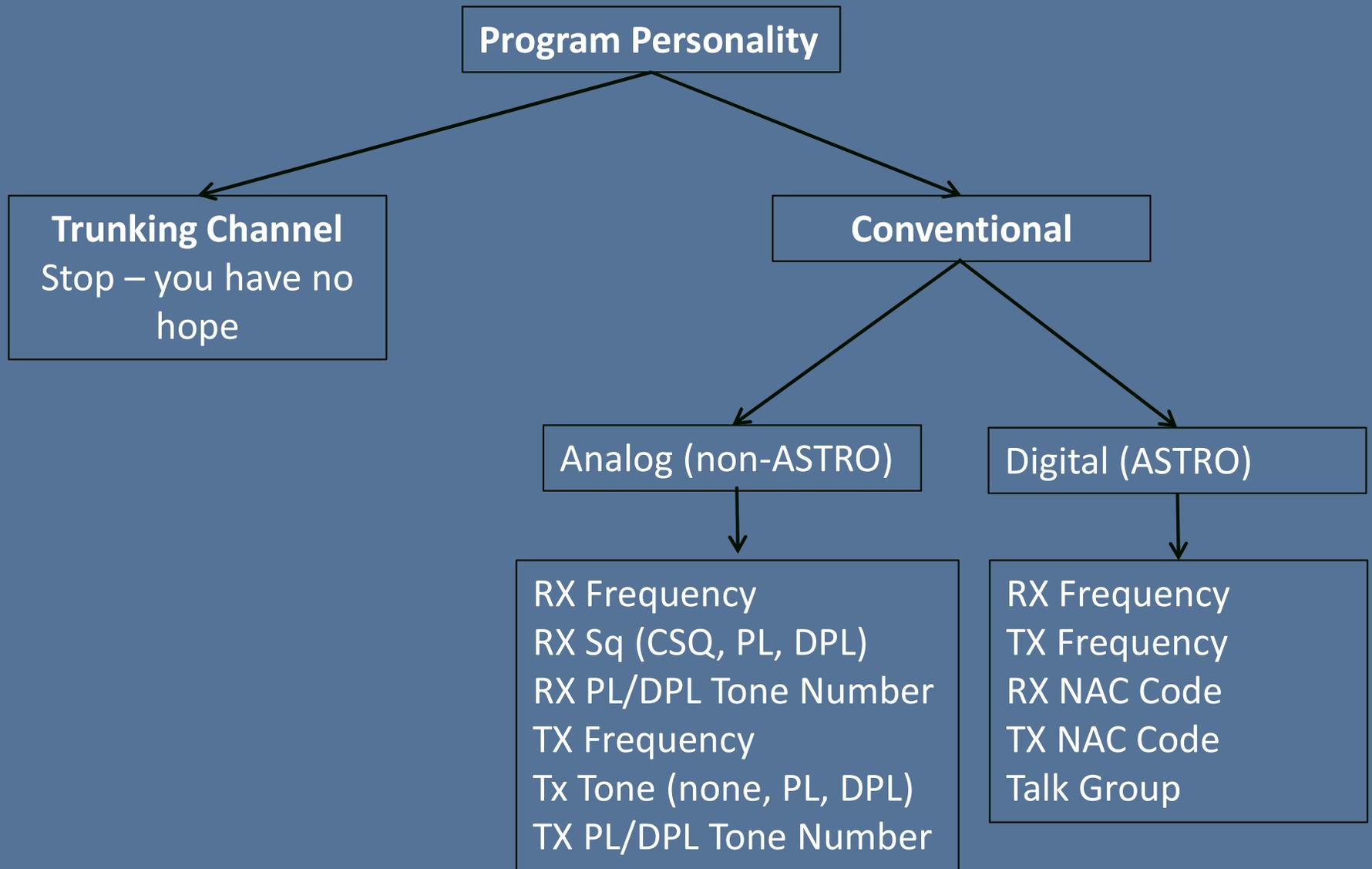
Step 1: Select a Personality

```
graph TD; A[Step 1: Select a Personality] --> B[Step 2: Input Frequency Options]; B --> C[Step 3: Assign the Frequency to a Zone and Channel];
```

Step 2: Input Frequency Options

Step 3: Assign the Frequency to
a Zone and Channel

CPS Programming



Configuration Management

The TDFM-9000 has within its operating Software, a configuration Menu. This menu is used by installation and avionics personnel to properly config the radio for its environmental and user needs. This configuration Menu , once set can be locked via a supervisory passcode feature.

To access the Configuration Menu.

From the standard operational screen, Press

FUNC Next Then press the Select
Button next to the Configuration Menu item on
the screen → →



N I F O G Code Plug



**National Interoperability
Field Operations
Guide**

**U.S. Department of Homeland Security
Office of Emergency Communications
Version 1.6**



**Homeland
Security**

May 2015

THE NATIONAL INTEROPERABILITY FIELD OPERATIONS GUIDE:

What is the “National Interoperability Field Operations Guide”?

The “National Interoperability Field Operations Guide” (N I F O G) is a pocket-sized listing of land mobile radio (LMR) frequencies that are often used in disasters or other incidents where radio interoperability is required, and other information useful to emergency communicators.

National Interoperability Field Operations Guide NIFOG

As part of the implementation of the TDFM-9000 in all aircraft, Technisonic will make available upon request a developed “Code-Plug” that is inclusive of all: Federal VHF, UHF, and 7-800Mhz NIFOG Frequencies.

The purpose of this initial code plug is to ensure that all units begin with a common frequency capability and lay-out. This effort should, the aircraft be dispatch in response to domestic emergency's, such as Hurricanes, Flooding, Tornado and other natural disaster, it will be able to field immediately utilizing the federal frequencies as defined by FEMA.

In addition to the FEMA frequency guidance, the Initial code plug is also inclusive of Common WX, Marine Radio, and US Forest Service Guard Frequencies.

National Interoperability Field Operations Guide NIFOG

Components:

- 1) Copy of the May 2015 NIFOG Booklet
- 2) TDFM-9000 Code Plugs for
 - 1) Module #1 VHF
 - 2) Module #2 UHF
 - 3) Module #3 VHF / 7-800
- 3) Cockpit Cards

US COMMON NIFOG
FREQUENCY CHART
VHF

US FOREST SERVICE

- 1 NATFF
- 2 AIRGUARD-USFS

NON FEDERAL INTEROP'S

INOP1

- 1 VCALL10
- 2 VTAC11
- 3 VTAC12
- 4 VTAC13
- 5 VTAC14
- 6 VTAC17
- 7 VTAC17D
- 8 VTAC33
- 9 VTAC34
- 10 VTAC35
- 11 VTAC36
- 12 VTAC37
- 13 VTAC38
- 14 VSAR16
- 15 VFIRE21
- 16 VFIRE22
- 17 VFIRE23
- 18 VFIRE24

NON FEDERAL INTEROP'S

1 MARINE 01A	26 MARINE 28
2 MARINE 05A	27 MARINE 63A
3 MARINE 6	28 MARINE 65A
4 MARINE 07A	29 MARINE 66A
5 MARINE 8	30 MARINE 67
6 MARINE 9	31 MARINE 68
7 MARINE 10	32 MARINE 69
8 MARINE 11	33 MARINE 70
9 MARINE 12	34 MARINE 71
10 MARINE 13	35 MARINE 72
11 MARINE 14	36 MARINE 73
12 MARINE 15	37 MARINE 74
13 MARINE 16	38 MARINE 77
14 MARINE 17	39 MARINE 78A
15 MARINE 18A	40 MARINE 79A
16 MARINE 19A	41 MARINE 80A
17 MARINE 20	42 MARINE 81A
18 MARINE 20A	43 MARINE 82A
19 MARINE 21A	44 MARINE 83A
20 MARINE 22A	45 MARINE 84
21 MARINE 23A	46 MARINE 85
22 MARINE 24	47 MARINE 86
23 MARINE 25	48 MARINE 87A
24 MARINE 26	49 MARINE 88A
25 MARINE 27	

INOP 2

**US COMMON NIFOG
FREQUENCY CHART**

VHF

FPP DECISION TREE

Program Personality

```

                    graph TD
                    A[Program Personality] --> B[Thinking Channel  
Stop - you have no  
hope]
                    A --> C[Conventional]
                    C --> D[Analog (non-ASTRO)]
                    C --> E[Digital (ASTRO)]
                    D --> F[RX Frequency  
RX Sg (CSQ, PL, DPL)  
RX PULS/Tone Number  
TX Frequency  
TX Tone (none, PL, DPL)  
TX PULS/Tone Number]
                    E --> G[RX Frequency  
TX Frequency  
RX NAC Code  
TX NAC Code  
Talk Group]
                    
```

NC - Incident Calling Channel VXXXX Mutual Aid
 IR - Incident Response LR - Law Enforcement

IMPORTANT:
 NIFOG frequencies are managed by different Agencies and Incident Managers. Unauthorized use of these frequencies is prohibited.

TECHNISONIC

US COMMON NIFOG
FREQUENCY CHART
UHF

INOP1

- 1 UCALL40
- 2 UCALL40D
- 3 UCALL41
- 4 UCALL41D
- 5 UCALL42
- 6 UCALL42D
- 7 UCALL43
- 8 UCALL43D

INOP2

FEDERAL INTEROP'S

- 1 NC 2
- 2 IR 10
- 3 IR 11
- 4 IR 12
- 5 IR 13
- 6 IR 14
- 7 IR 15
- 8 IR 16
- 9 IR 17
- 10 IR 18D

**US COMMON NIFOG
FREQUENCY CHART**

UHF

MED MEDICAL			
1 MED-1	23 MED-62	45 MED-20	67 MED-72D
2 MED-11	24 MED-63	46 MED-21D	68 MED-73D
3 MED-12	25 MED-7	47 MED-22D	69 MED-8D
4 MED-13	26 MED-71	48 MED-23D	70 MED-81D
5 MED-2	27 MED-72	49 MED-3D	71 MED-82D
6 MED-21	28 MED-73	50 MED-31D	72 MED-83D
7 MED-22	29 MED-8	51 MED-32D	73 MED-9D
8 MED-23	30 MED-81	52 MED-33D	74 MED-91D
9 MED-3	31 MED-82	53 MED-4D	75 MED-92D
10 MED-31	32 MED-83	54 MED-41D	76 MED-93D
11 MED-32	33 MED-9	55 MED-42D	77 MED-10D
12 MED-33	34 MED-91	56 MED-43D	78 MED-101D
13 MED-4	35 MED-92	57 MED-5D	79 MED-102D
14 MED-41	36 MED-93	58 MED-51D	80 MED-103D
15 MED-42	37 MED-10	59 MED-52D	
16 MED-43	38 MED-101	60 MED-53D	
17 MED-5	39 MED-102	61 MED-6D	
18 MED-51	40 MED-103	62 MED-61D	
19 MED-52	41 MED-1D	63 MED-62D	
20 MED-53	42 MED-11D	64 MED-63D	
21 MED-6	43 MED-12D	65 MED-7D	
22 MED-61	44 MED-13D	66 MED-71D	

IMPORTANT:
 NIFOG frequencies are managed by different Agencies and Incident Managers. Unauthorized use of these frequencies is prohibited.

TECHNISONIC

Evolution

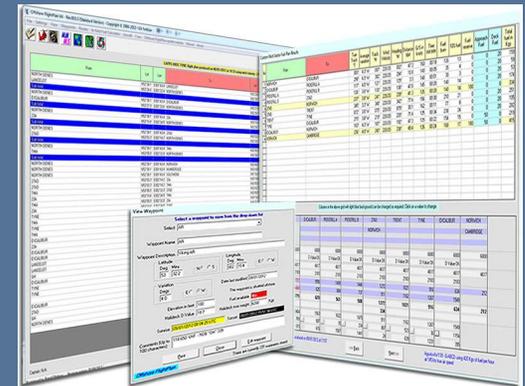
Software and Capability Updates



Evolution

You Spoke, Technisonic Listened, Version 2.2.6 Software –

- * Added a config menu that allows the knob direction to be changed when the alternate menu is displayed.
- * Added a config menu that allows the "Combined Mute Indicator" (X) to be turned off. Combined mute still functions but the indicator can be turned off for use when the radio is wired for separate mode
- Added a Timer Revert function for the Recall menu.
- Added a timer Revert to Num Lock Mode.
- Added Color Selection for each Module
- Added Channel Only, Zone Only, or Channel /zone selection to recall Mode.
- Glare Timer - “ ADMIN TIMER” When display is set to FULL BRT, a timer can be set to temporarily brighten the screen to overcome Glare and reflections.



Evolution

**You Spoke, Technisonic
Listened, Hardware Updates**

Developed a Hardened Lens for the TDFM-9000 - New lens provides the same performance as the original but has been hardened to resist unintentional impacts. (Not Unbreakable, but much tougher to do!) Factory Standard on all new radios as of June 2018

New Dust Cover Solution for Keypad will be available Summer of 2019. Protect the radio from dust and dirt intrusion in doors off and high dust environments.

Evolution



*Satellite, LAN, Cellular,
Handheld and Web*



TECHNISONIC ANNOUNCES ITS NEW MULTI-PURPOSE COMMUNICATIONS PORT CAPABILITY in TDFM-9000 /9100

MCP is the next leap in airborne communications integration. This disruptive new technology makes communication systems integration possible through a series of dedicated communications ports on the TDFM-9000 series radios. Developed to address circumstances where additional temporary capabilities are needed such as handhelds, or where additional communication integrations are mission-critical such as Satellite, MCP Technology provides a unique set of capabilities that can now be leveraged by TDFM-9000 series operators to further expand and support their changing mission requirements without need for wholesale replacement of existing systems.

Evolution - Multi-Purpose Communications Ports



*Satellite, LAN, Cellular,
Handheld and Web*



TECHNISONIC ANNOUNCES ITS NEWMULTI-PURPOSE COMMUNICATIONS PORT CAPABILITY in TDFM-9000 /9100

Developed in response to customers' requests, Technisonic has significantly improved the TDFM-9000 /9100's by expanding the platform's capability to fully support an additional two (2) external communications devices beyond the radio's internal All-band FM modules.

Moto-turbo, Harris, PRC and Satellite communications are just some of the product lines our customers have requested be supported.

Resources

The screenshot displays the Technisonic website's resources page. At the top, the navigation bar includes the company logo and menu items: PRODUCTS, SUPPORT, MODERNIZATION/UPGRADES, and TRAINING/OPS RESOURCES. Below this, three featured articles are shown, each with a photograph of a helicopter and a 'SEE MORE' button. The articles are for the H-60, UH-72, and CH-47F. Further down, two Technisonic TDFM-9300 and TDFM-9000 radios are displayed with their respective control panels and frequency lists. The TDFM-9300 radio shows frequencies for WEATHER (162.4500), Zone 1 CHASE 5, AURORA TAC 2, Zone 1 MED NW, and BASE WEST 47.2000. The TDFM-9000 radio shows WEATHER (162.4500), Zone 1 CHASE 5, AURORA TAC 2, Zone 1 MED NW, Zone 1 REGIONAL P1, and Zone 1 LZ 02. The Windows taskbar at the bottom shows the time as 2:59 PM on 7/7/2022.

Technisonic communications

PRODUCTS SUPPORT MODERNIZATION/UPGRADES TRAINING/OPS RESOURCES

H-60

UH-72

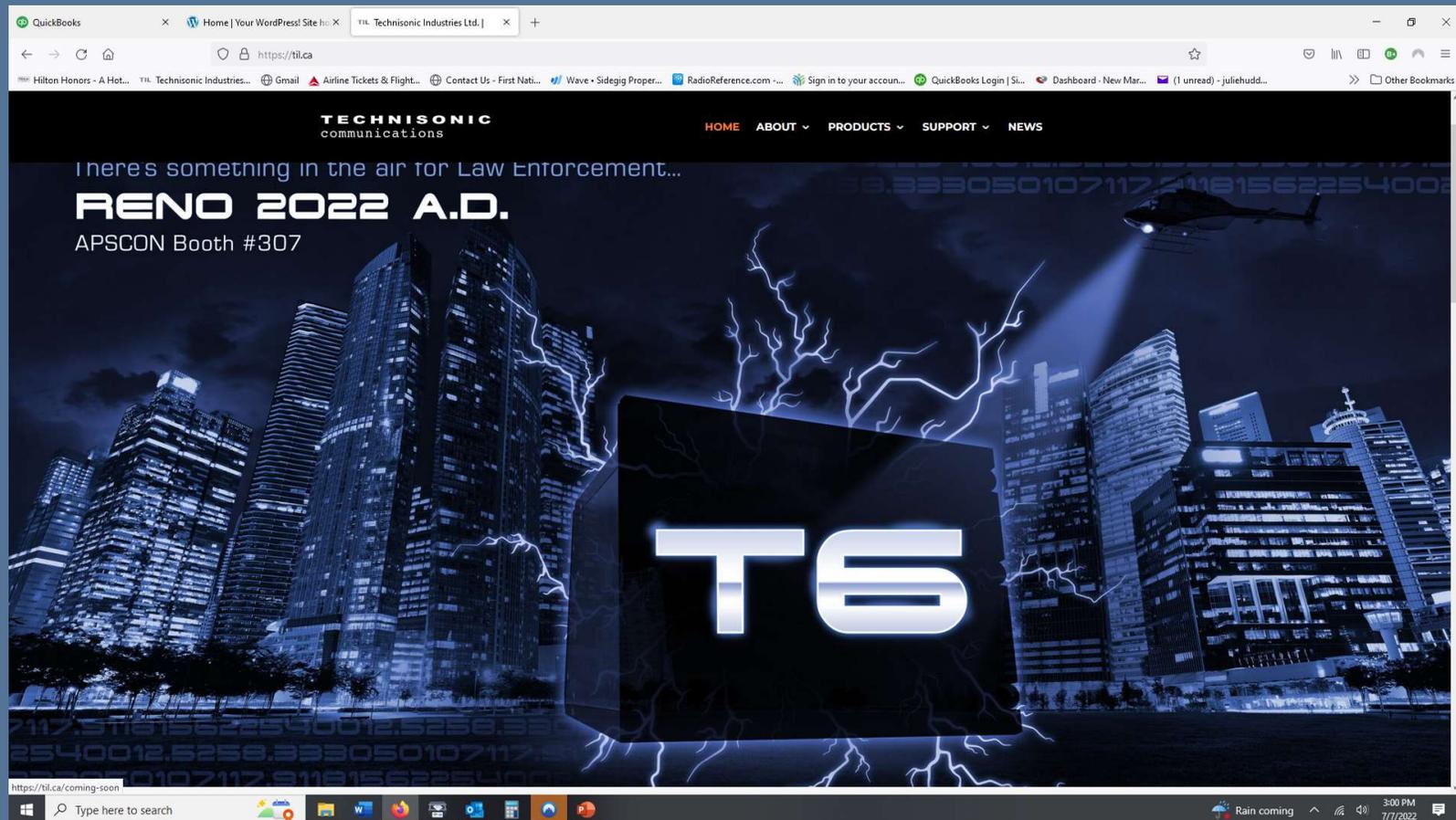
CH-47F

The TDFM-9300

The TDFM-9000

Resources

Support Tab Holds all certification, Software and support information available for download free of charge.



Resources- Product Pages

Product specific resources such as manuals, drawings, firmware and the like can be found on the specific product page on the til.ca website



[Download TDFM-9000 Brochure \(480 KB\)](#)

[Download TDFM-9000 Installation Instructions \(Rev. D, Issue 4\) \(10.2 MB\)](#)

[Download TDFM-9000 Operating Instructions \(Rev. F for Version 2 Software\) \(14.8 MB\)](#)

[Download TDFM-9000 Operating Instructions \(Rev. C for Version 1 Software\) \(9.1 MB\)](#)

[Download APX CPS Programming Software/Cables Ordering Guide \(43 KB\)](#)

[Download TDFM-9000 3D-CAD \(.Step\) File \(6.9 MB\)](#)

[Download APX CPS Software and Programming Cable Guide](#)

[Download MCP Brochure \(480 KB\)](#)

Personal Support Resources



Technisonic is proud to provide the very highest level of support for our products, customers, and operators. Our commitment to our support is the driving company principle. From exceptional initial quality, to Telephone, and Onsite field support, to Programming and End User training. Technisonic ensures your customers receive the very highest level of support, leading to the very best experience and approvals of Technisonic products and personnel.

Jim Huddock
Dir Business Development
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Jon Rorke
Factory Technical (Motorola)
Technisonic
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Field Approved Software Updates



TDFM-9000 /9300 /9200 Current Production Software

Main Code Update: Software 11S151M V2.4.0 MAIN SW

11S152K JM60/APX INTERFACE SW. V2.4.0.

Firmware Updates - Technisonic Firmware Procedure

Performing Update:

Installations Instructions

**TDFM-9000 SERIES
SOFTWARE UPGRADE
PROCEDURE**

DOCUMENT NO. 14886
REVISION
DATE OF ISSUE: JANUARY 18, 2011

**Technisonic
Limit**

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The document contains design and other information which
document may not reflect a particular application or situation
without the prior written permission of Technisonic.

INTRODUCTION:

Please take a few minutes to carefully read the operational software for the TDFM-9000 in this
release. This document describes the procedure to load new software for the TDFM-9000 in this release.
There are several categories of SW that need to be loaded when upgrading. The TDFM-9000 software are field
replaceable and only require a PC, Programming cable and terminal software to load the SW.

EQUIPMENT REQUIRED:

- 1) PC with Windows XP or higher.
- 2) PC-USB programming cable. (TDFM)
- 3) Terminal program such as Tera Term V.3.73 or higher.
- 4) 25V power supply.

SETTING UP THE USB TO SERIAL DRIVER ON THE PC

The TDFM-9000 in this release have a built in USB to serial adapter
in Standard Mode. It will work in Virtual Serial Port. The driver
loaded in some Windows operating systems. The driver can be
downloaded from www.technisonic.com/PC2S

Load the driver for Windows V2 (X86) for Win XP or V2 (64)
Run the driver installer.

Observing the serial port

- 1) Plug up the cable and make the hardware
pinning the cable. Hold the plug and the Standard
mode.
- 2) Connect the programming cable PC-USB to the cable.
- 3) The PC will detect new hardware and finish installing.
- 4) Manage the PC to the Device manager. Open my
computer Properties

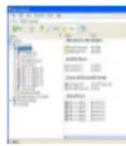


FIGURE 1: My Computer in Device Manager

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FIGURE 2: System Properties Tab

Click on the Hardware Tab.



FIGURE 2: System Properties Tab

The serial Device Manager installed on the Tera Term V.3.73. The manual for a USB
to serial port based Mode 1 driver, as it is needed for the new data.

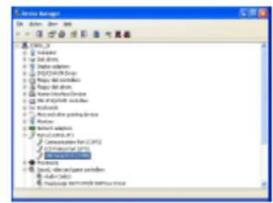


FIGURE 3: USB to Serial Port (COM1) set in Device Manager

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14886

THANK YOU ALL

